VOL. XXXVII. No. 4 APRIL 1952

MECCANO MAGAZINE

JET BOMBER

9D.

DINKY TOYS

TRADE MARK REGD.

These attractive miniature figures add the final touch of realism to gauge 0 and 00 railways. Most of them can also be used effectively with other Dinky Toys.

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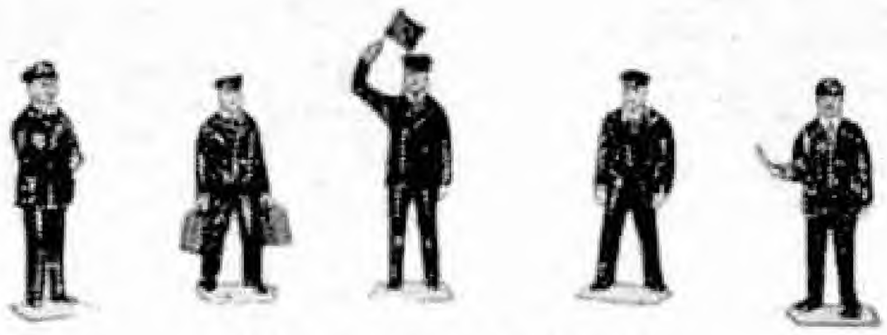

No. 1 Station Staff
Guard, Ticket Collector, Engine Driver, Porter, and Porter with luggage **4/8**

No. 2 Farmyard Animals
Two Horses, two Cows, a Pig, and a Sheep .. **6/6**

No. 3 Passengers
Mother and Child, Business Man, Hiker (Man), Hiker (Woman), Newsboy, and Woman .. **5/3**

No. 4 Engineering Staff
Storekeeper, Greaser, Engineroom Attendant, and two Fitters **4/8**

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Two Dining Car Attendants, two Hotel Porters, and a Dining Car Conductor **4/8**

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These three figures suitable for use with Gauge 0 Railways will be available later

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MADE IN ENGLAND BY MECCANO LIMITED

Next Month: "A NEW ZEALAND WONDERLAND." By V. May Cottrell

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His Late Majesty King George VI

Here is my favourite portrait of his late Majesty King George VI. I am not surprised to find that this photograph is one that has a universal appeal, for it seems to me to show in the most graphic manner those characteristics that so greatly endeared the King to us.

To begin with, his real kindliness is clearly evident in his expression as he listens to his grandson's story. This kindliness is not just that of a grandfather; it is also that of a monarch accustomed to listening with appreciative interest to what his subjects may have occasion to say to him.

To me the photograph is even more symbolic of the King's steadfast courage, for it was taken at a time when he was slowly regaining strength after a very serious operation that itself followed a long period of illness. Now, when we look back on his reign, we begin to realise how faithfully he carried out the countless duties those war-troubled years placed upon him, and gain some idea of the great strain they imposed on him.

No King has ever been nearer to his people than was His Majesty. He had travelled extensively and had seized every opportunity to see something of the lives and homes of people of all classes. And we were all accustomed to hearing his voice as we sat by our firesides on Christmas Day, when we formed the greatest family gathering this world has ever seen. Indeed we who had never met him had learned to know him, and to like him, and we all feel that we have lost a friend.

We have lost a King; but he is followed by a Queen who has seen in him an example of what a monarch should be. She has enjoyed a happy life in the Royal Family of which he was head, and as she has grown older she has taken an increasing, share in the high duties that members of such a family are called upon to undertake. I know that I am speaking for all the thousands of "*M.M.*" readers when I express the hope—and the belief—that she will carry further the great traditions established by George VI, and that the reign of Elizabeth II will be one of outstanding progress and prosperity.

World's Largest Walking Dragline

Excavator Removes 27 Tons in a Single Bite

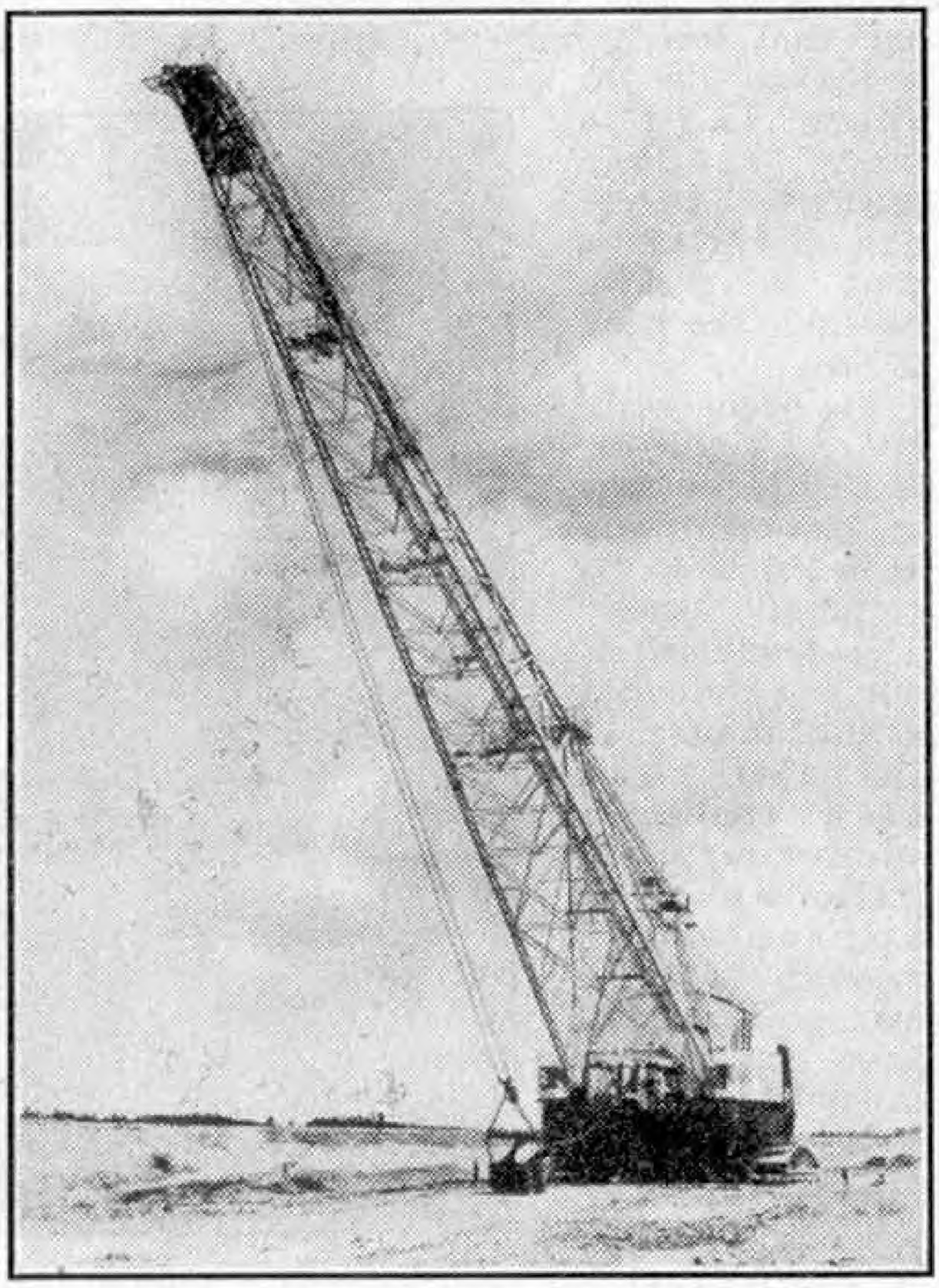
BRITAIN now possesses the largest walking dragline in the world. This giant machine has been built to remove the overburden that covers vast beds of iron ore in the Priors Hill opencast ironstone mine, near Corby, of Stewarts and Lloyds Ltd. Its full title is the RapieR W.1400 Walking Dragline. It was designed and constructed by Ransomes and Rapier Ltd., Ipswich, and because of its size had to be erected on the site.

In the working position the jib of the dragline towers to a height of 175 ft., only a few feet less than that of the Nelson Column in Trafalgar Square. Its working weight is 1,650 tons. The house carrying the machinery and controls has a floor area equal to that of two tennis courts, and when the machine itself has to move it takes ponderous strides 7 ft. in length, walking on "shoes" that are 48 ft. long and nearly 10 ft. in width, and weigh 56 tons each.

The dragline is completely electric in operation. It takes power at 6,600v. through two trailing cables, but in spite of its immense size and capacity it can easily be operated by one man from either of the two control cabins that are provided. These give the operator a clear and uninterrupted view of the pit from which overburden is being removed.

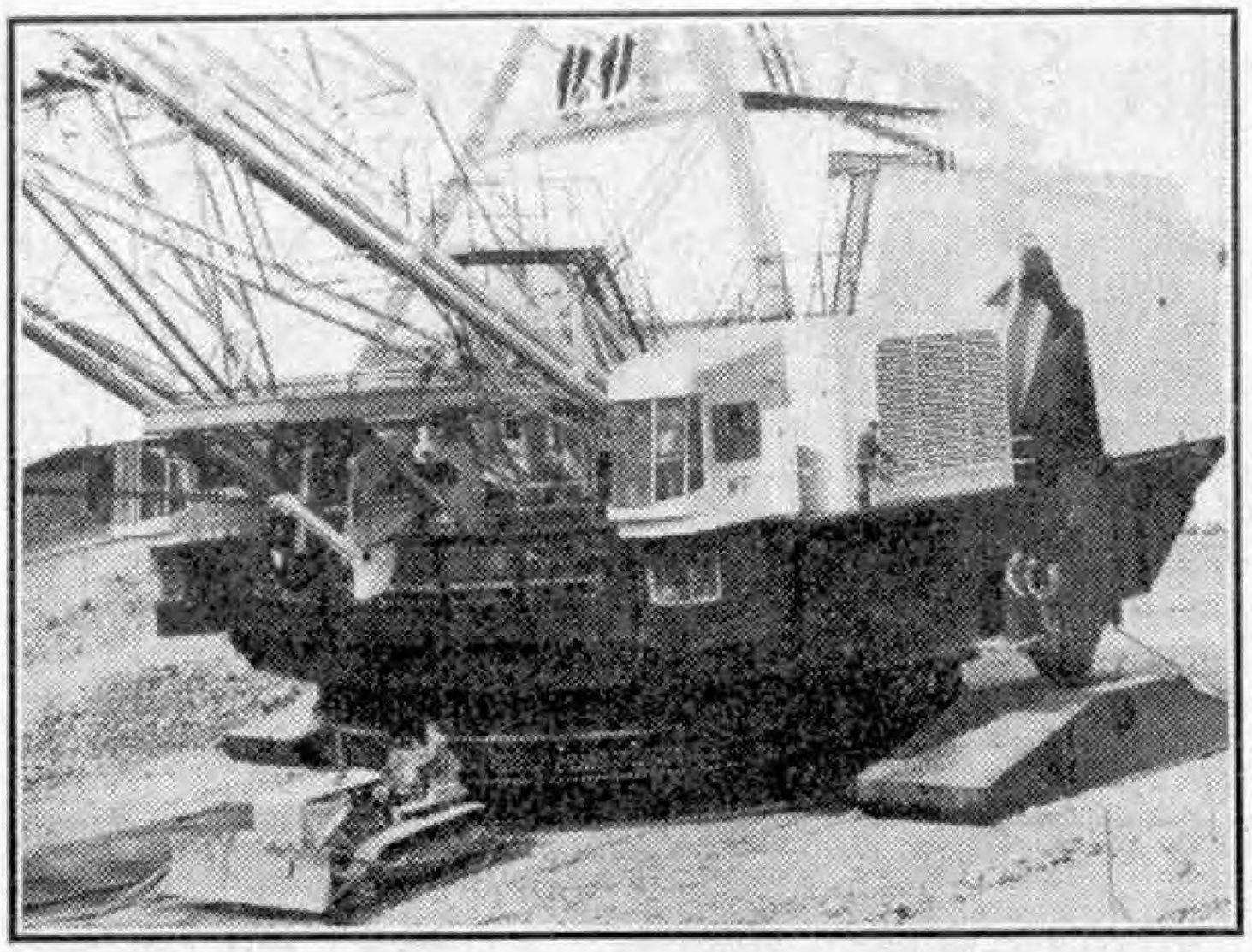
The giant boom or jib of the W.1400 is 282 ft. long, and has a reach of 260 ft., or very nearly the length of a football field. It rises to such a height in its working position that aircraft warning beacons must be provided on it as an indication of danger to low flying aircraft at night. Both the jib and the A frame above the machinery house, seen in the lower illustration on the opposite page, are of all-welded, all-tubular construction. The bucket that digs into the overburden itself weighs 22 tons, and is capable of lifting about 27 tons of spoil at one operation. Filling it, raising it to a height of 100 ft., swinging it round to the point where its contents are discharged and returning it to the digging position takes only a minute or so, and when the machine is slewing round during this operation the head of the jib reaches a speed of nearly 23 miles per hour.

The base of the structure of the dragline weighs 227 tons. The superstructure turns on a giant roller bearing, the roller path of which is a 32-piece steel casting machined to take its 120 tapered rollers, each of which has an average diameter of 10 in. On them the whole structure turns easily and smoothly, driven through the rotate rack, which is a gigantic gear wheel 33 ft. in diameter and with 208 huge teeth, which have a pitch of 6 in. and a depth of 1 ft. 7 in.



The towering jib of the largest walking dragline in the world is well shown in this picture of the machine. The illustrations to the article are reproduced by courtesy of Ransomes and Rapier Ltd., Ipswich.

In action the dragline is the opposite of a power shovel. The latter pushes its bucket into the ground to be excavated, while the dragline pulls its bucket through the spoil. How this is done is clear from



The dragline walking. Its size can be realised by comparing it with the bulldozer in front of it.

the illustrations of the dragline on these pages. A good idea of the immense size of the W.1400 is given by comparison with the bulldozer shown in front of it in the illustration at the head of this page.

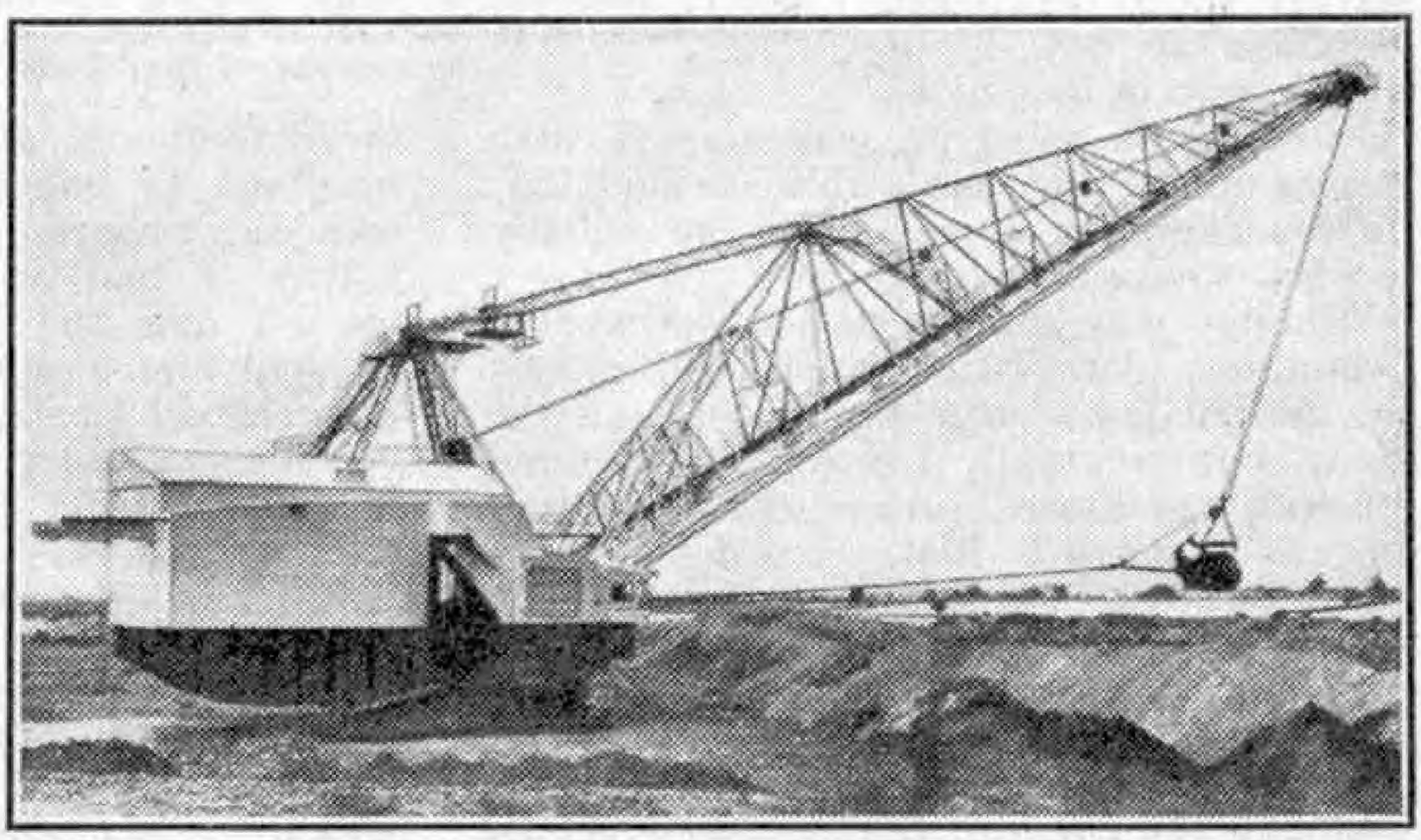
The largest walking dragline in the world provides an impressive spectacle when in operation, with its gigantic machinery house and its immense jib towering upward and reaching forward. It becomes even more impressive when it has to be moved and its giant shoes are brought into play. Then it looks like some uncanny pre-historic monster, plodding backward irresistibly with heavy strides.

The shoes are carried by legs attached to frames enclosing an eccentric that can be turned by a cross shaft driven through reduction gear by motors in the house. When the dragline is at work it rests on the ground, with the shoes at their highest level. When the time comes for it to move the shaft is turned, and the eccentrics at its end turn with it, with the result that the shoes are lowered to the ground. The turning is continued and as the shoes can go no further downward the machine itself is raised from the ground. The weight is so distributed that when this takes place it is the rear that rises, the front end remaining on the ground. When the machine has reached its highest position it has already been pulled backward through part of its stride, and this is completed as the eccentric continues to turn and the shoes rise off the ground.

The walking gear incorporates a novel method of propulsion designed to relieve the main walking shafts of all bending movements. There is also a special return mechanism that prevents the shoes from being forced out of parallelism with the axis of the machine. Without such a mechanism this may occur when one shoe slips further than the other during walking movement.

The main electrical equipment has been designed and manufactured by the British Thomson-Houston Co. Ltd. Current at 6,600 v. is fed into two main switching cubicles, where it divides through independent isolating switches to supply the main motor-generator sets. These provide current for the various motors installed in the machine, and for auxiliary and lighting transformers.

Hoisting, dragging (*Continued on page 190*)



The walking dragline at work removing overburden in order to gain access to the ore in the Priors Hall opencast ironstone mine near Corby.

My Day with Stanley Mortensen

By the Editor

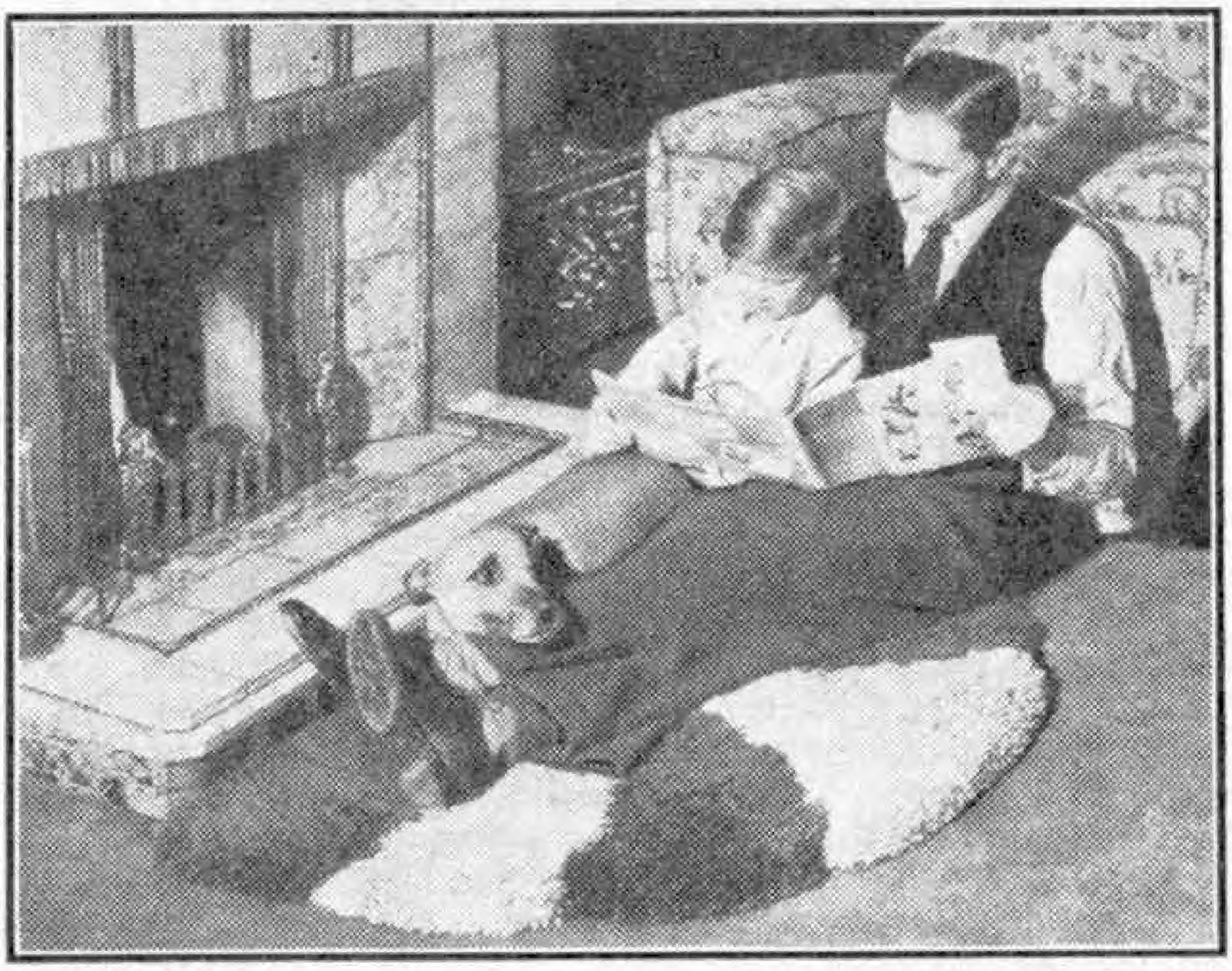
THE Sun was shining brightly as I drove into Blackpool one day last February. The dense crowds that in the holiday season throng its promenades were missing, but there were many people in its streets, and somehow it was easier to realise that Blackpool itself is a large and interesting town, with many fine shops, splendid parks—and a famous football team!

It was the Blackpool Football Club that was chiefly in my mind, for I was on my way to spend a few hours with Stanley Mortensen. Like thousands of readers in all parts of the country, I knew Stan. as a footballer who had achieved fame with Blackpool and with England's International teams, and I was delighted that at last I was to meet this great player. On his side he was equally pleased to make the acquaintance of the Editor of the "*M.M.*" and through him to talk to "*M.M.*" readers.

We were on the best of terms immediately. Nobody indeed could be otherwise with Stan., as I soon realised. Needless to say, he is well-known in Blackpool. Wherever we went he was greeted with smiles and it gave me a thrill to find that in his company I was given an equally cordial welcome.

Stanley was anxious to tell me what a wonderful place Blackpool is, not merely in the holiday season, but throughout the year, but eventually I brought him round to speak of himself and of the game that means so much to him. First I had to be introduced to Sable, whose picture you can see in the illustration on this page showing Stan at his fireside. This picture is typical. With the famous footballer is his nephew, with whom he is going through the pages of the football coaching chart, on the ground that it is never too early to learn. Now nothing pleases Stan. better than to be doing something for boys, and before I left him I was delighted to find that he is playing a great part in forming a Youth Club in Blackpool, giving his time and energy freely to help its members to develop themselves in countless different ways.

"There is nothing I enjoy more than helping boys," he told me. "And not only boys. In fact, for a long time past I have found myself away from home four or even five nights every week giving talks to football and athletic clubs and doing my best to encourage boys and young men everywhere."



Stanley Mortensen at home, studying coaching charts with his nephew. Sable waits, on the alert for an invitation to a wrestling match. Photograph by courtesy of the "Daily Herald."

Now I had got him speaking about himself and the talk went on happily. I asked him how he had made a start in the football world.

"That was easy. I began at school and it wasn't long before I found myself selected for the town school team of South Shields, where I lived. This really excited me."

"So you became famous very early in your career?"

"Wait a minute," he interposed with a laugh. "After playing three games I was dropped, which gave me a splendid opportunity of practising resignation after

disappointment. But I got back again next year in the position I liked best, inside right, and the team went so far as to be in the last 16 in the English Schools Shield Competition."

"That was a good start. What next?"

"Well, by this time I had begun to be ambitious and eventually the chance I had dreamed of came to me. I had joined what was called the South Shields Ex-Schoolboys Club, formed by a South Shields schoolmaster, and one of our games was played at Blackpool against a similar team. We all took ourselves very seriously and trained as well as we knew how, with the result that we did play an attractive game. After the match Mr. William Parkinson, Chairman of the Blackpool Club, asked me if I would like to become a Blackpool player and before long I was signed on."

And that is how Stan. came to Blackpool, and there he has stayed ever since. He takes pride in the fact that he is a one-club player, and Blackpool takes pride in this international who joined the club as an amateur a few weeks before he became 17 years of age.

Alas, before Stan. could get very far the war intervened, and eventually he joined the forces. He volunteered for the R.A.F. and became a wireless-operator air-gunner, but his career in the air came to an end when a Wellington in which he was flying caught fire and crashed into a fir plantation. Luckily Stan. came out alive, but suffered various injuries, of which the worst was a head wound.

In action against the Scottish League at Middlesbrough in March 1950, when the Football League won 3 - 1. Throwing himself towards Mortensen is Brown, Rangers, and coming across to tackle him is Evans, Celtic, but Stan. scored. Photograph by courtesy of the "News-Chronicle."

While in the R.A.F. he managed to put in a good deal of football with service sides, during which he met many famous players. At length, he returned to Blackpool, now a grown-up and accomplished player, and his meteoric rise to fame began.

It is impossible in a short article to tell you all that passed between Stan. and myself as we talked on this sunny afternoon, looking out in the meantime over Stanley Park. Naturally I asked him which he thought the most outstanding of the many goal scoring feats with which he has thrilled onlookers. After a pause he said that it was probably an astonishing goal he scored for England against Italy in Milan during the Continental tour in 1948. He raced away from a Matthews pass, and his speed carried him almost to the dead ball line. He was so harried by opponents that a pass was scarcely possible, so there was nothing left

Minshull, then Liverpool's goalkeeper, preparing to receive the ball from an acrobatic header by Mortensen, with Lambert looking on. No goal this time. Photograph by J. Taylor, Blackpool.

but to have a crack at goal. He shot for the near angle, hitting the ball so truly that it sped through an incredibly narrow space into the top of the net behind the astonished goalkeeper.

Then he told me about a goal he scored in the 1948 international at Hampden Park. Lawton, the English centre forward, had won the ball in a mid-field tackle, and then found his way barred by Young, the Scottish centre half, whom he knew to be difficult to beat. He cleverly slowed up and kept the ball close until Stan. ran

A flying leap through the air by Bert Williams, Wolverhampton's International goalkeeper, fails to stop Stan scoring. Photograph by H. A. Hallas, Blackpool.

behind him and came up level with him on the left, which left Young facing not one centre forward, but two. If he tackled Lawton the centre forward could slip the ball to Stan., while if he watched Stan. Lawton could go ahead himself. Actually Stan. found the ball placed in front of him in such a way he could take it in his stride, and in a second the ball was in the net. "One of the best goals I have *helped in scoring*" is Stan.'s modest comment on this incident, in which he thought Lawton showed the greatest skill and cleverness.

He told me too the story of Blackpool's great cup run of 1948, when he scored in every round and in the final, a game that was narrowly lost to the great Manchester United side.

"Why did you lose that game?" I asked.

Stan. thought for a moment, told me something of the goal scoring to remind me that Blackpool held the lead twice, and then added that even in a cup tie good football will bring results. Apart from everything else Manchester United won, as they deserved, because they had the sense to continue to be themselves and to play their own game when they were behind.

In this judgment there is a fine lesson for all of us, in any circumstances. Stan. is always ready to appreciate good play and good sportsmanship. Only a few days after my talk with him I read of his compliments to Derek Williams, the 17-year old goalkeeper who was making his first appearance in the Manchester City side, in a League match against the Blackpool team.

"By the way," he interrupted himself when talking about his international games, "do you know how I came to play in my first international?"

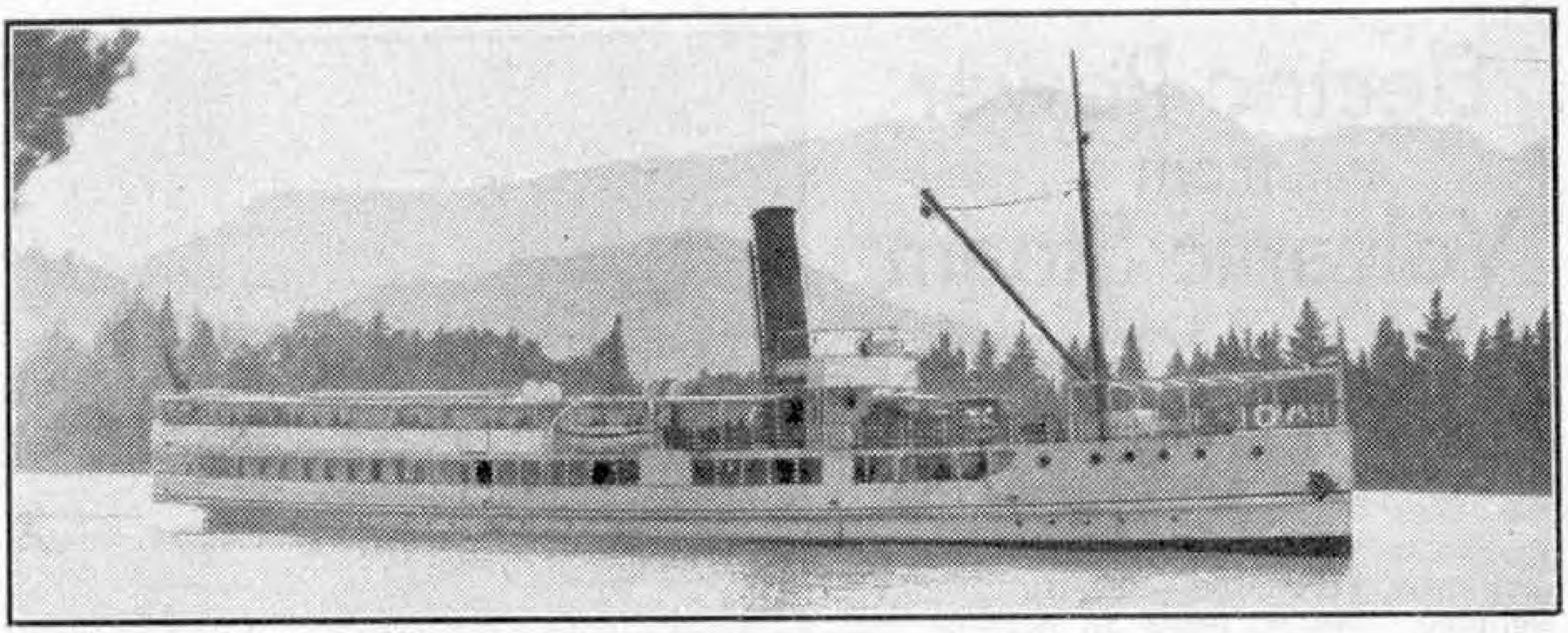
I was beaten for the moment, and said so. I am not a Leslie Welch!

"I played for Wales," he said. Then I remembered, and we enjoyed a good laugh at this strange beginning of the career of a famous English international.

"It was in war time, of course," he told me. "I was at Wembley as a reserve for England, but Ivor Powell, the Welsh half back, was hurt in the first few minutes of the game and it was agreed that Wales should be allowed a substitute. But they had no twelfth man, and as I was the only player handy I was told to turn out—for Wales. I was so excited that I began to peel off my R.A.F. tunic as I stood up on the touch line, but somebody pulled me along to the dressing room to do the thing properly. We "Welsh" lost, but we made a brilliant rally that brought the score from 4–1 to 4–3."

The talk turned to playing the game, not merely in internationals and on league grounds, but on the countless pitches where young hopefuls do their best and dream of international fame. Stan. himself worked up from school football and junior play to the dizzy heights of international appearances, and what he does not know about the best ways of making progress is scarcely worth bothering about.

"Young players must always be prepared to give their best," he told me. "In particular they must pay full attention to their training. With the help of older players, who are always willing to coach youngsters, they should (*Cont. on page 190*)



Lake Steamers in New Zealand

By Lieut. S. Halliday, R.N.Z.N.V. (S.)R.

THE turbine steamship *"Earnslaw,"* a photograph of which appears on this page, is unique among ships in more ways than one, and well worthy of the attention of all ship lovers. She has accommodation for 1,050 passengers and 40 tons of general cargo, and has been operating on Lake Wakitipu, in the South Island of New Zealand, at a height of approximately 1,000 ft. above sea level, ever since she was built in 1911. She was constructed by Messrs. J. McGregor and Co., of Dunedin, New Zealand, for her present owners, the New Zealand Government Railways Department, and is a steel vessel of 240 tons register, with a length of 160 ft., a beam of 24 ft. and a moulded depth of 9 ft. Her draught is 6 ft. 6 in.

The most interesting features of the ship are her construction, and the method by which she arrived at Lake Wakitipu. She was built in sections in Dunedin, and the various sections were then transported to the lake by rail, across rugged and mountainous country, via the Caverham Tunnel and the town of Gore. She was reassembled and launched at Kingston, at the southern tip of the lake.

The ship is powered by two sets of triple-expansion jet condensing engines, each developing 500 i.h.p. at 200 r.p.m., which are supplied with steam by two locomotive-type boilers. Her normal speed is 12 knots, but under natural draught she has attained a speed of 15¼ knots, and on trials, under forced draught, she has reached 16½ knots.

Throughout her long service the *"Earnslaw"* has performed vital work for the owners of the many sheep-stations and farms on the banks of Lake Wakitipu, the largest lake in the South Island. In many instances she is still their only contact with the outside world, for there roads are few and inadequate, apart from foot tracks over very rough country.

Allied with the *"Earnslaw"* in serving the lakeside residents, and the many tourists whom Lake Wakitipu attracts, is the small steamer *"Ben Lomond,"* also owned and operated by the New Zealand Government Railways Department. Like her larger companion, the *"Ben Lomond"* was built in Dunedin and transported overland to be launched at Kingston. She was built in 1876 and named the *"Jane Williams"* before being purchased by the Railways Department. Although she is one of the oldest vessels still afloat she still relieves the *"Earnslaw"* when that ship is withdrawn for boiler cleaning or for other reasons.

Since the great gold rush days of the 1860's, when the shores of Lake Wakitipu swarmed with men who were eager to make their fortunes quickly, many small steamers have plied on its waters. Several of the early steamers were paddlers, and probably the best known of these was the *"Mountaineer,"* which was built in Dunedin in 1878 and was sold out of service in 1932.

The vessel in the illustration at the head of the page is the turbine steamship "Earnslaw," which is seen off Queenstown, on the shore of Lake Wakitipu, in the South Island of New Zealand. The Lake is surrounded by forested mountains and is about 1,000 ft. above sea level. Photograph by courtesy of New Zealand Government Railways Department.

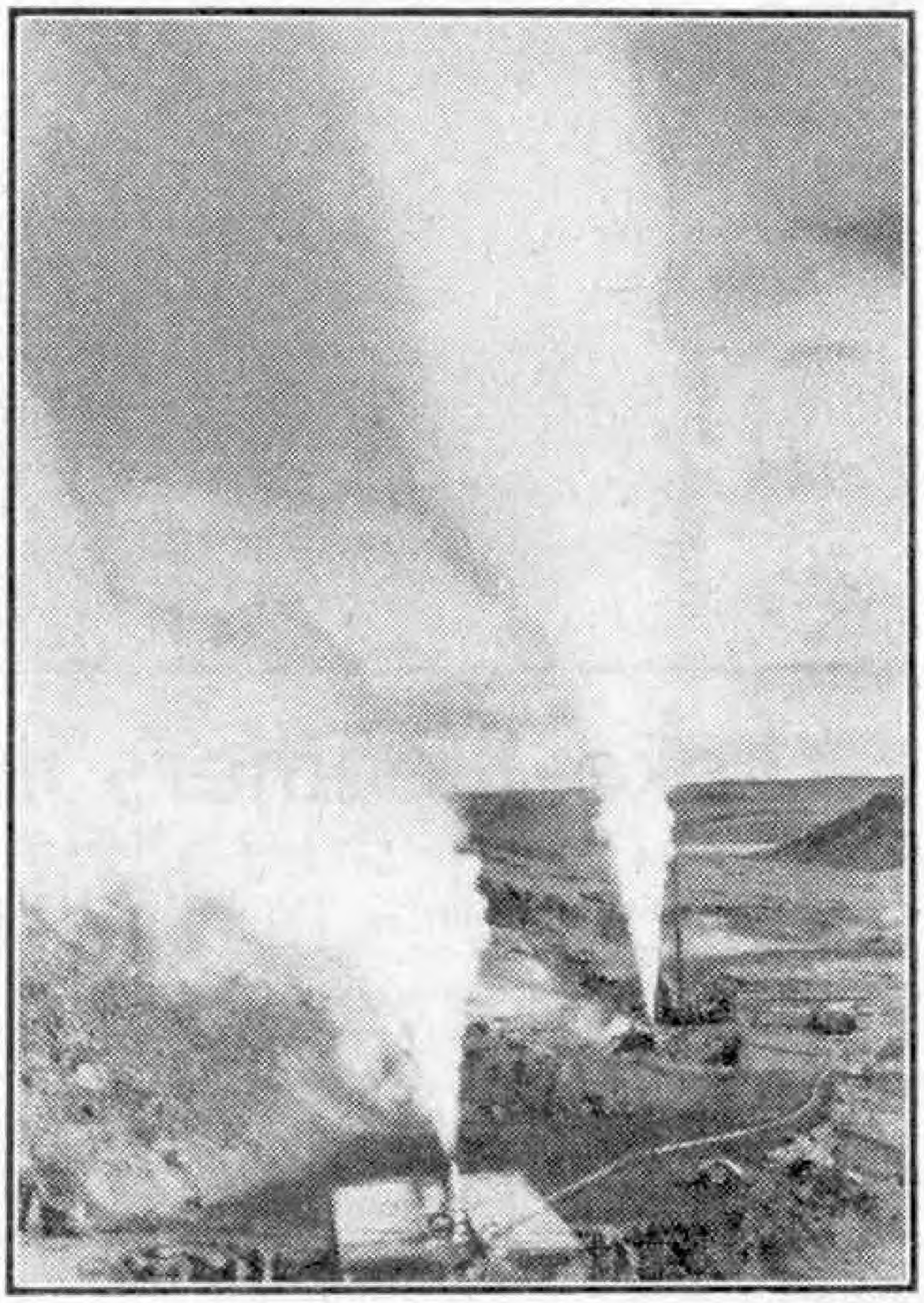
Electric Power from Volcanic Steam

By V. Burton

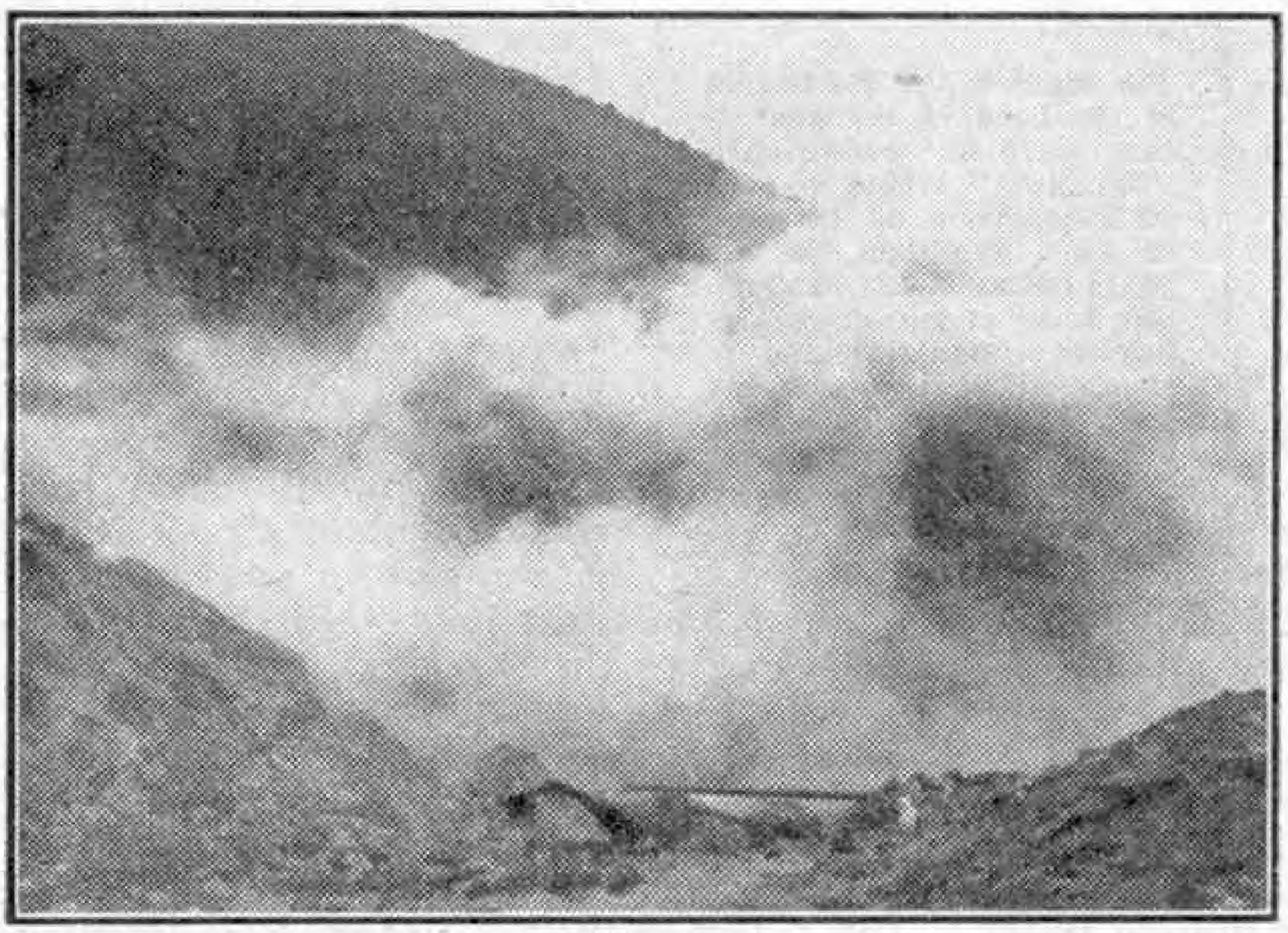
A FEW miles from Reykjavik, the capital of Iceland, a jet of steam is spurting to a height of 250 ft. from the blue volcanic rock, with a roar so deafening that it is impossible to stay near it for more than two or three minutes. "We're going to harness it," Icelands' engineers tell you, "and put it to work for us in industry."

About two years ago I watched them make the first tentative borings into the great bed of steam that lies beneath Iceland's volcanic rocks. Since then, the predominant sound at Krisuvik, the site of the borings, has been the chug-chug of the engine that operates the drills. Slowly the engineers bored through the rock, cutting an initial hole the size of a soup plate until the tip of the eight-inch drill reached a depth of 760 ft.

"Then things began to happen," one of the engineers says. "From beneath our feet came a roaring rumbling sound, like that when our volcano Mt. Hekla erupted. There was a moment's suspense. Then we started to run—and only just in time, for the jet of steam that roared up flung the one-ton boring machinery so high that in crashing it smashed through a bed of concrete 28 in. thick."



Where engineers are trying to harness Iceland's volcanic steam. Photographs, Polar Photos.



Steam and sulphurous fumes escaping from fissures in Iceland's volcanic mountain region.

Now the job is to harness this man-made geyser and make it provide power for the factories and homes of Reykjavik, a city of 55,000 people.

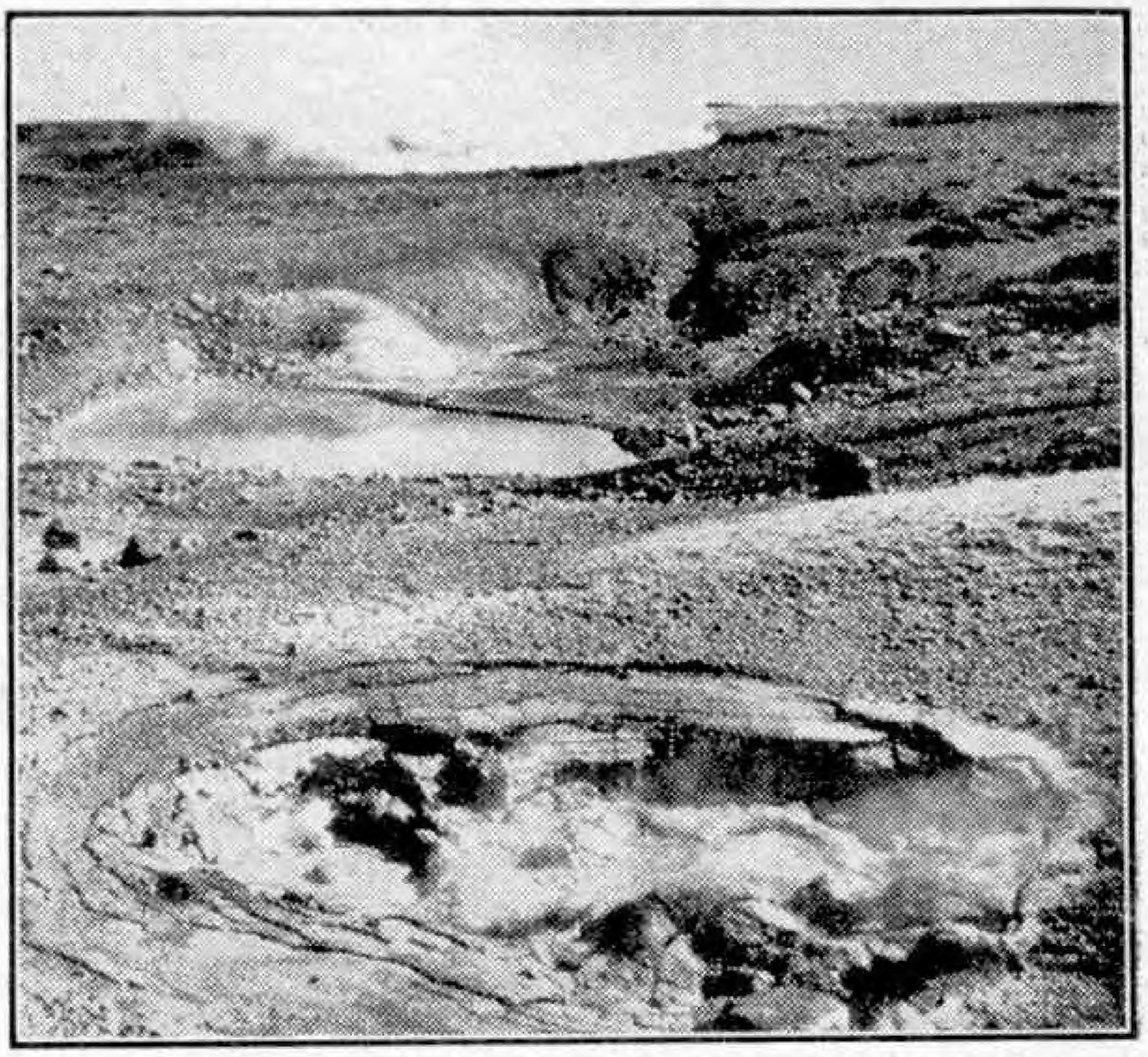
"Iceland is a poor country," you are told. "We have no coal or timber or oil, and it costs us a lot in foreign currency to import fuel. Yet under our feet there's enough steam to blow the island sky high. We're boring for it."

In Italy, engineers have harnessed volcanic steam for industrial purposes, and there it is producing some 300,000 kilowatts annually. In New Zealand too, volcanic

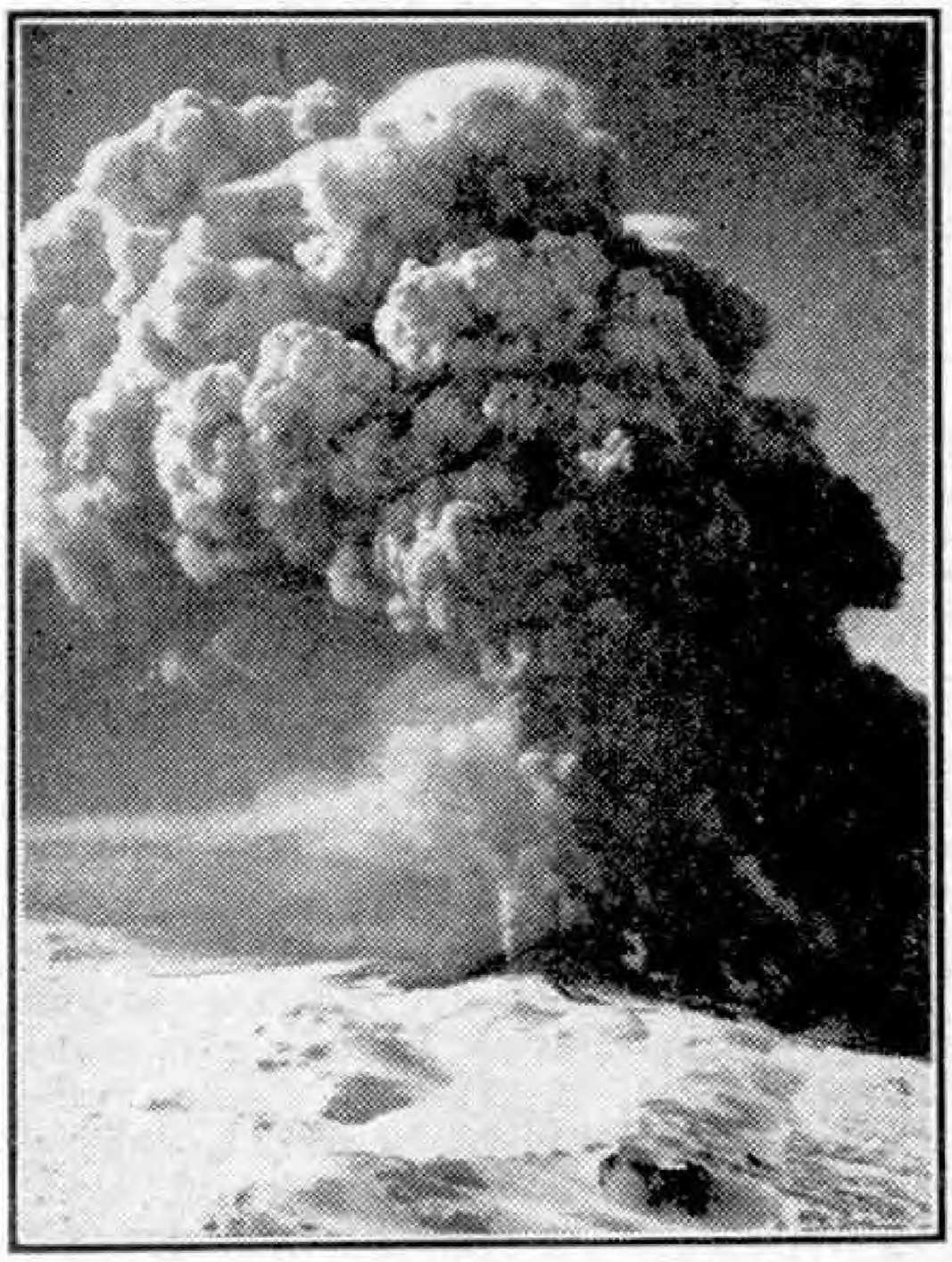
steam is being used experimentally to drive turbines. But the Icelanders have no previous experience to help them. They have sent engineers to Italy to pick up what they can, but even so they are working largely in the dark—feeling their way to the background noise of roaring steam.

The jet that screams from the rocks at Krisuvik will yield enough electricity to provide the needs of a medium-sized town, and the drills are now boring for further supplies of steam.

Meanwhile, the Icelanders are working out how they are going to harness the jets. It will not be just a case of capping them as one caps an oil gusher, and then controlling the flow of steam. The present jet represents some 90 tons of steam an hour, but it is not all pure steam. It contains water, and it will be necessary to extract this before the steam reaches the machinery it is to drive. Experiments towards the solution of this problem are being made now, and when they are concluded a power station will be built near the jets.



Lava pools near where borings are being made to extract volcanic steam for the generation of electric power.

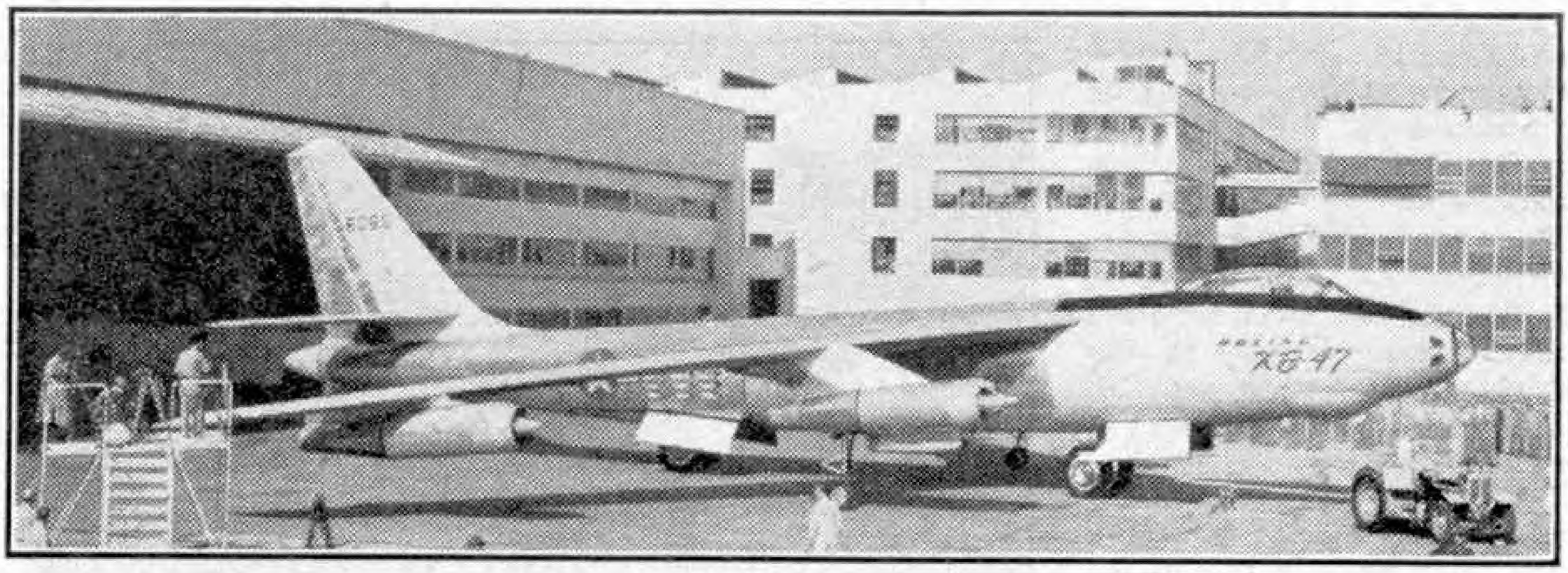


Mount Hekla is connected by underground channels with the site where Iceland's engineers are boring for steam. When the volcano erupted in 1947 lava welled up beneath a farmhouse near the site.

In the meantime the engineers are working in sub-zero temperatures, with the wind sweeping down from the white flanks of the mountains and across the contorted lava formations, drilling for further supplies of steam. Already the second boring has reached a depth of 500 ft. "We only have another couple of hundred or so feet to go before we hit the steam bed," they say, "and then we'll have to run again!"

The harnessing of volcanic steam would mean a very great deal to the economy of Iceland. For the Icelanders have built up an important herring by-product industry. They are producing valuable herring oil and fertiliser, and the factories of Reykjavik, and of Akureyri, the island's second city, are working at full blast.

"There are all the herrings in the sea necessary to the extension of our new industry," the Icelanders say. "All we need now is the additional power to extend it. That from our waterfalls is not sufficient, and it seems we're walking on our latent power—volcanic, superheated, roaring steam in unlimited quantities. Sometimes it comes roaring up through the earth naturally. We're going to harness it."



Boeing's Atom-Bombers

By John W. R. Taylor

ON 8th February 1949 a sleek silver warplane took off from Moses Lake A.F. Base in Washington State and raced non-stop across the entire 2,289-mile span of the United States to Andrews Air Force Base, Maryland, in 3 hr. 46 min., at an average speed of 607 m.p.h. Such a record would have been spectacular if set up by the latest sweptwing jet fighter or high-speed research aircraft. In fact, it was achieved by a sixty-ton six-engined bomber—the Boeing XB-47 "Stratojet."

This flight proved to the world that Boeings were still in the forefront of big 'plane development, for the "Stratojet" is no high-speed freak. On the contrary, its great power and speed are intended primarily to enable it to carry the atomic bomb quickly, at very high altitude, to any target within 1,200 miles of its base, drop the bomb accurately, and then return home safely. From nose to tail it incorporates every up-to-the-minute design feature and piece of equipment needed to make it America's finest bomber; yet its story really began 36 years ago, when "Bill" Boeing built his first stick-and-string seaplane in a tiny hangar on the shores of Lake Union, Seattle.

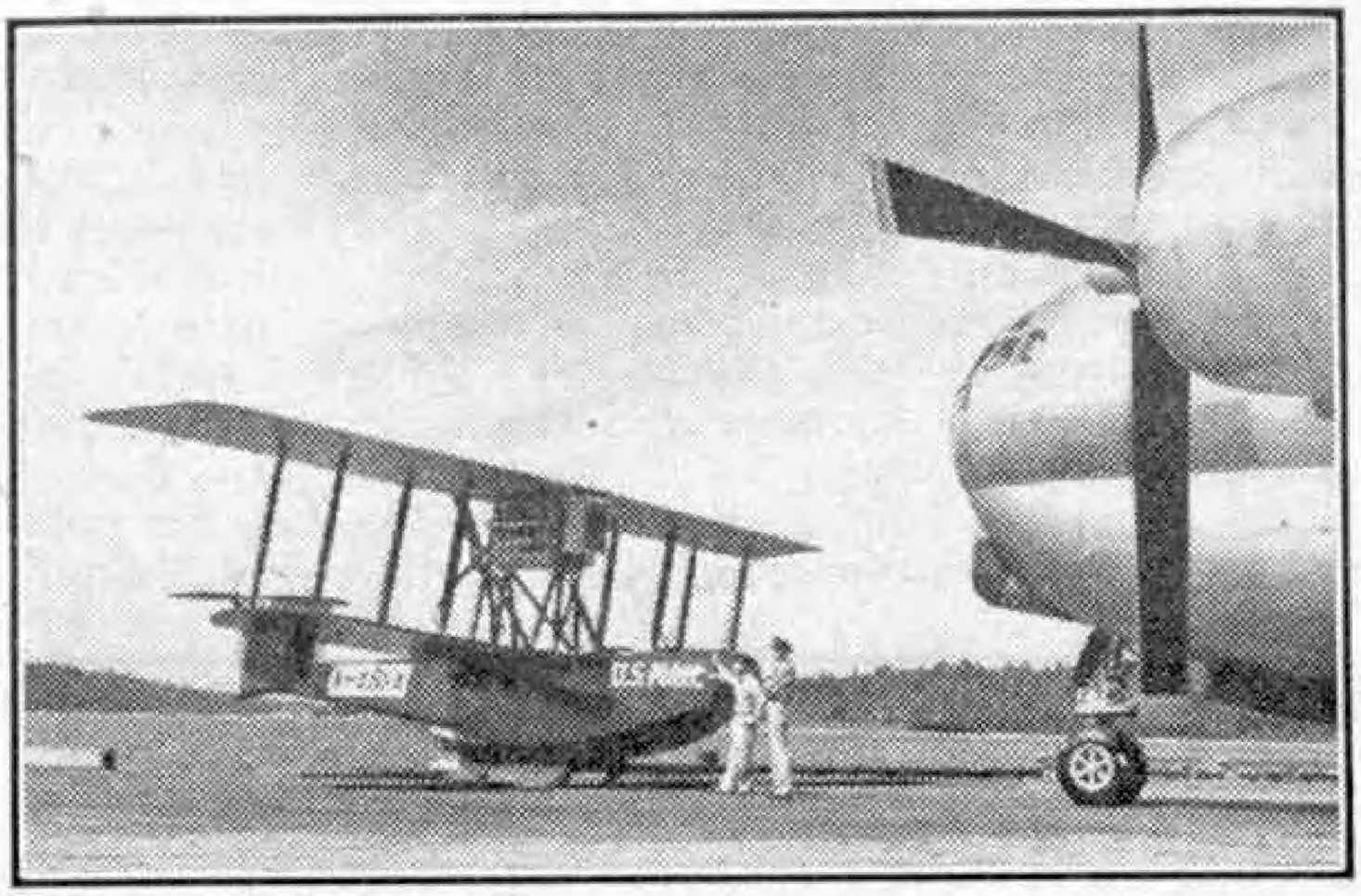
At that time, construction of an aircraft like the "Stratojet" would have seemed an almost impossible undertaking. It still does, and would be but for the fact that "Bill" Boeing's little hangar has grown into one of the world's biggest aircraft factories, with an equally vast "branch office" at Wichita, Kansas, staffed by designers and engineers whose experience of building big, complex aeroplanes is second-to-none in the world.

The photograph above shows the Boeing XB-47 "Stratojet" bomber. For our illustrations and that on which our cover is based we are indebted to the Boeing Airplane Company, U.S.A.

Not all Boeing aeroplanes have been big. The earliest genuine Boeing design was the little B.1 flying boat of 1919, the first aircraft ever to carry commercial air mail in North America. The machine that put the young company on its feet was the PW–9 fighter of 1923, more than 100 of which were supplied to the U.S. Air Service. They were racy little biplanes, with a top speed of 160 m.p.h., and each fitted with a 440 h.p. Curtiss D–12—the engine that made possible the earliest really streamlined U.S. and British fighter 'planes. Then came the American switchover to radial engines, which produced the aggressive "Wasp"-powered Boeing P–12 fighters, so popular in Hollywood flying films in the '30s, followed in turn by the P–26 when the monoplane returned to fashion in 1933.

But by that year work had started on an aeroplane destined to make the words "Boeing" and "bomber" almost synonymous — the B–17 "Flying Fortress." When the first XB–17 flew on 28th July 1935 it was far from being an aerial fortress. Its defences consisted of just five machine guns, carried on pivot-mountings; and although its four 750 h.p. engines produced a top speed of 250 m.p.h., it was obviously no match for the new 300 m.p.h. eight-gun fighters being built in Europe. To make matters worse, it crashed within three months of its first flight, because somebody forgot to remove before take-off some pins that locked the tail controls to prevent damage by gusts of wind while the aircraft was on the ground.

Fortunately, Army Air Corps experts had seen enough of the XB–17 by then to

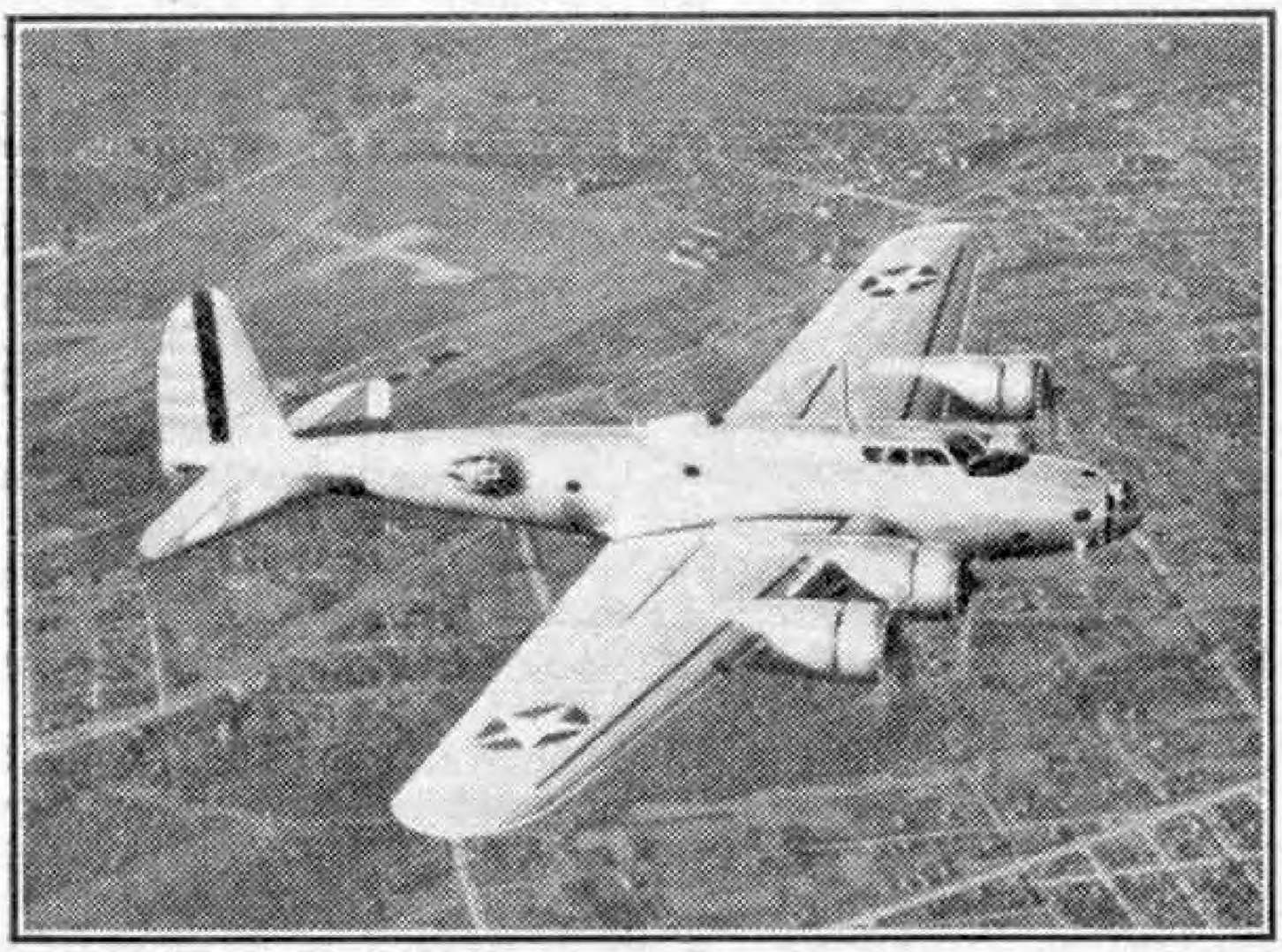


The earliest genuine Boeing design was the little B.1 flying boat of 1919 seen here. On the right is the nose of one of the big Boeing "Stratofreighters" of to-day.

realise that, with more powerful engines and more guns, it might well be made into an offensive weapon of tremendous power. So they ordered 13 improved Y1B–17 "Fortresses" in 1936, then 39 turbo-supercharged B–17Bs in 1938 and finally, during World War II, over 12,600 more B–17s, built by Boeing, Douglas, Vega and a host of sub-contractors. They dropped between them nearly half of all the bombs loosed on Europe by U.S. bombers, and shot down more than two-thirds of all the enemy fighters destroyed over Europe by U.S. bombers. To supplement their guns, they added the new tactic of high-altitude flying to their defences, dropping bombs from heights up to 30,000 ft., out of range of many enemy guns and fighters. Simultaneously, in 1944–5, the "Fort's" big brothers, the B–29 "Superfortresses," were busy delivering 96 per cent. of all the bombs dropped on Japan in World War II, finishing up with the two atom-bombs that brought the war to a close.

Meanwhile the time was ripe for yet another big change in warplane design, for the advent of jet power had begun to make even the mighty B–29, with its 10–ton bomb load and 12 guns, look old-fashioned. Boeings replaced it by the even more powerful B–50 "Superfortress," and at the same time developed a civil counterpart, the "Stratocruiser," as flagship for the world's airlines. Behind the scenes they started work on the XB–47 "Stratojet," no mere jet-engined development of the "Superfortress," but a completely new sweptwing atom-bomber with a score of untried design features that would make it as revolutionary as the first 1935 "Fortress."

It was no easy task. The jet-propelled aircraft that emerged from World War II were fast. A British Gloster "Meteor" had proved that conclusively by lifting the World's Absolute Speed Record from 469 m.p.h. to 606 m.p.h. in one jump. But increased power and speed had introduced tremendous new problems. Chief of these was "compressibility," the building up of shock waves that could batter an aeroplane to pieces as it approached the speed of sound, which is 660 m.p.h. at 30,000 ft. German scientists had proved that the effects of compressibility could be postponed by sweeping back wings and tail surfaces. So, determined to make their XB–47 the world's fastest bomber, Boeing designed it as a perfectly streamlined fuselage carried on narrow,



Boeing YB-17A bomber, the first four-engined aircraft fitted with turbo-superchargers for improved performance at height.

sharply sweptback wings. Nor were the wings merely sweptback: they were made razor thin, to reduce drag to a minimum, and so flexible that they droop when the aircraft is on the ground and curve up at the tips during flight. This flexibility, gained without sacrificing strength, enables the wing tips to "ride the bumps" while the fuselage rides far more smoothly than a conventional 'plane.

To avoid breaking up airflow over the wings, Boeing designers slung the XB–47's six 4,000 lb. thrust General Electric J–35 jet engines underneath in pods. The problem of how to retract undercarriage wheels into the thin wings was solved by making them retract into the fuselage instead! The idea of having two pairs of main wheels under the fuselage, with small "balancer" wheels at the wing tips, was tried out on a converted "Marauder" bomber, proved successful and adopted for the XB–47. Finally, in case even 24,000 lb. of thrust proved insufficient to lift the bomber from the runway with a full load, 18 rockets were fitted in the rear fuselage to provide a further 20,000 lb. thrust. As a result, a few weeks after the original XB–47 prototype made its first flight on 17th December 1947, it began a series of startling, almost vertical climb tests, trailing a cloud of smoke from its rockets.

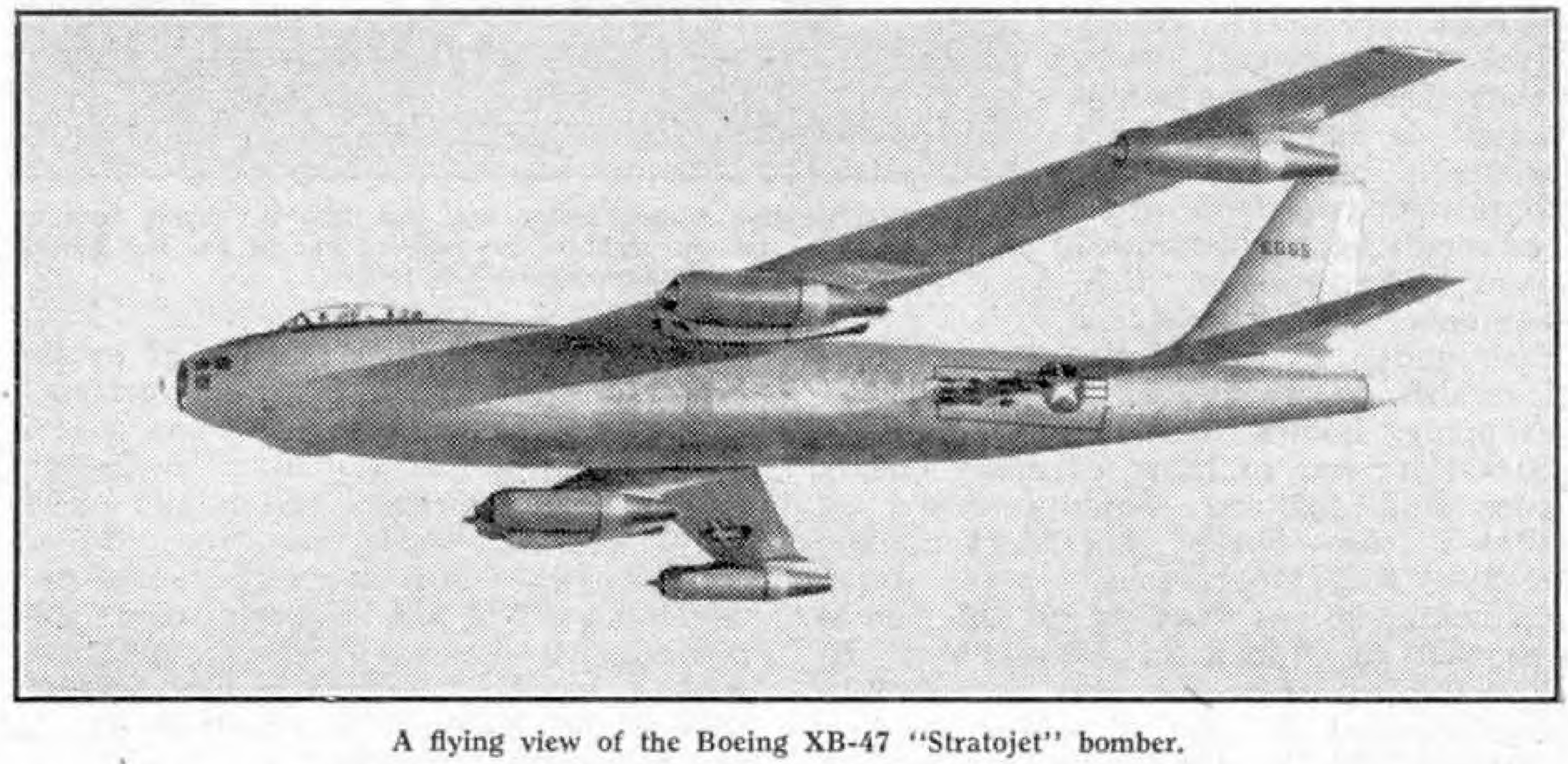
The second XB–47 flew on 21st July 1948, and two months later the U.S. Air Force ordered the type into full production at Wichita, adding that they wanted the first production B–47A within 18 months. They got it, on 1st March 1950, and have since received enough B–47As to form at least one complete squadron.

Some idea of what this achievement has involved can be gained from the few statistics that are not secret. For example, construction of a B–47 involves 3,464,000 man-hours and the two prototypes cost nearly £4¼ million. This compares with 138,000 man-hours and about £125,000 for the first "Fortress."

To produce the B–47 it was necessary to design and build more than 60,000 separate jigs and tools, of which the wing jig alone required the drilling of some 15,000 bolt holes to an accuracy of .0005 in. Finally, the bomber itself has to be built up from more than 52,000 different kinds of parts, not including rivets and engine components. The result is a "medium" bomber, able to fly at more than 600 m.p.h. at very high altitudes, with up to 10 tons of bombs.

The first prototype XB–47 was re-engined with six 5,200 lb. thrust General Electric J–47 jet engines in the Autumn of 1949, and production B–47A and B–47B "Stratojets" differ little from this aircraft, except that the 'Bs carry external fuel tanks under their wings and can be equipped for mid-air refuelling, to increase their combat radius to 1,500 miles. They are the finest bombers in service to-day with any air force.

Boeings never believe in resting on their laurels, however, and already they have produced a much larger, eight-engined bomber on the same lines, named the XB–52 "Stratofortress." Its weight is nearly double that of the B–47A and its prototype cost anything up to £27 million.



A flying view of the Boeing XB-47 "Stratojet" bomber.

BOOKS TO READ

Here we review books of interest and of use to readers of the "M.M." With certain exceptions, which will be indicated, these should be ordered through a bookseller.

"THE BOOK OF ELECTRICITY"

Edited by R. W. Austin
(Warne. 5/-)

Electricity has become so much a part of our everyday life that we have come to take it for granted, seldom giving a thought to Faraday, Maxwell, Hertz, Marconi and others whose pioneer work laid the foundations for the great variety of ways in which electricity is used today.

This book, designed primarily for the young reader, explains in non-technical terms how and why electricity works, the functions of dynamos, motors, transformers and generators, and the vital part these play in the operation of a modern power station. The principle and equipment of the vast national grid system that enables electric current generated in the power stations to be distributed to remote country districts are explained; as also are the telephone, telegraphy, broadcasting, television and radiolocation. There is, too, a short chapter on house wiring and domestic appliances.

The book is illustrated with 85 excellent line drawings and four colour plates.

"WINSTON CHURCHILL"

By J. G. Lockhart
(Duckworth. 6/-)

This new short biography of the greatest Englishman of our time tells the story of Mr. Winston Churchill's crowded and adventurous career. We read of his schooling, his military training at Sandhurst and his service in the British Army in India, Egypt, and Africa before he began his long and tempestuous career as a great politician, during which periods of defeat and victory have alternated in dramatic fashion.

The story provides the background that enables us to appreciate fully the combination of courage, driving power, and unswerving purpose that made Mr. Churchill a tower of strength to the British people during the darkest period of the second World War.

"THE ROVING ROVERS"

By Edward R. Home-Gall
(Hennel Lock. 7/6)

This exciting story will be hailed with delight by young Soccer enthusiasts. It concerns a group of lads who serve together in the county regiment, are demobilised at the same time and decide to form a football club. They are all good fellows, although some have little weaknesses, and there are excellent prospects of a bright future for them. Then a shadowy enemy strikes at them, apparently without motive, Dogged by this relentless foe and hounded by the authorities, the Rovers fight to remain a team and to prove their right to a golden opportunity that depends on their progress in the F.A. Amateur Cup.

"RAILWAY MOTIVE POWER"

By Harry Webster, B.Sc.
(Hutchinson. 30/-)

To many people the locomotive, preferably a steam one, is the most interesting part of the railway as a whole. Mr. Webster recognises its popular appeal and in his book he sets before the enthusiast and the more technically-minded reader an account of the developments that have taken place in its design and construction from the earliest days until now.

There are three main parts of the book. The first deals with general considerations affecting motive power in different countries. In addition the handling and performance of steam, electric and diesel locomotives receive attention.

Steam motive power is the special concern of the second section, in which developments from the earliest times are described, with references to certain notable locomotives classes or examples and descriptions of present-day locomotives at home and abroad. In the third section electric and diesel locomotives are given equally detailed attention, the final chapter dealing with the latest form of motive power, the gas turbine locomotive.

Illustrations are fairly numerous and very well reproduced. They include many line drawings and diagrams, and the book is provided with a useful glossary and an index.

While the book succeeds in its somewhat ambitious object of dealing adequately with all forms of railway motive power, there are several little slips that could have been avoided.

"GUNS, SHELLS AND ROCKETS"

By Major J. C. S. Hymans, M.A.
(Gale and Polden. 3/6)

Although bombs are now a major weapon of war, shells and rockets are still used extensively. This excellent little book explains the principles and operation of these various types of projectiles. It is designed as a simple guide to ballistics, which, in general terms, can be described as the science of the motion of missiles—of shells inside and outside guns, of rockets, and of jet-propelled projectiles.

Readers who have not an elementary knowledge of science should begin the book by reading the special chapter under that heading, as the knowledge it imparts is essential to an understanding of the remainder of the book. Many neat little diagrams illustrate important points in the text.

"TOM MERRY'S SECRET"

By Martin Clifford
(Hamilton. 1/6)

Many older "*M.M.*" readers will recall with pleasure how, when they were youngsters, they revelled in the hilarious and often exciting adventures of Tom Merry and the chums of St. Jim's, recorded by Martin Clifford in a weekly periodical. Now we are to have a new series of these famous schoolboys' adventures, published at the rate of two stories a month under the general title of "Gold Hawk Books."

There is not the slightest doubt that this, the first of these new stories, will create a host of new Merry enthusiasts among young readers. Here are all the old favourites, from the immaculate Arthur Augustus D'Arcy, complete with monocle, to Kildare of the Sixth, captain of St. Jim's. Fun and mystery are nicely mixed to provide a rattling good yarn.

"AQUARIUMS"

By Anthony Evans
(Muller. 6/-)

Aquariums are back in favour again, and here is another book on this most interesting hobby. It has been written specially for beginners by a research worker and journalist who has long made aquarium keeping a special interest.

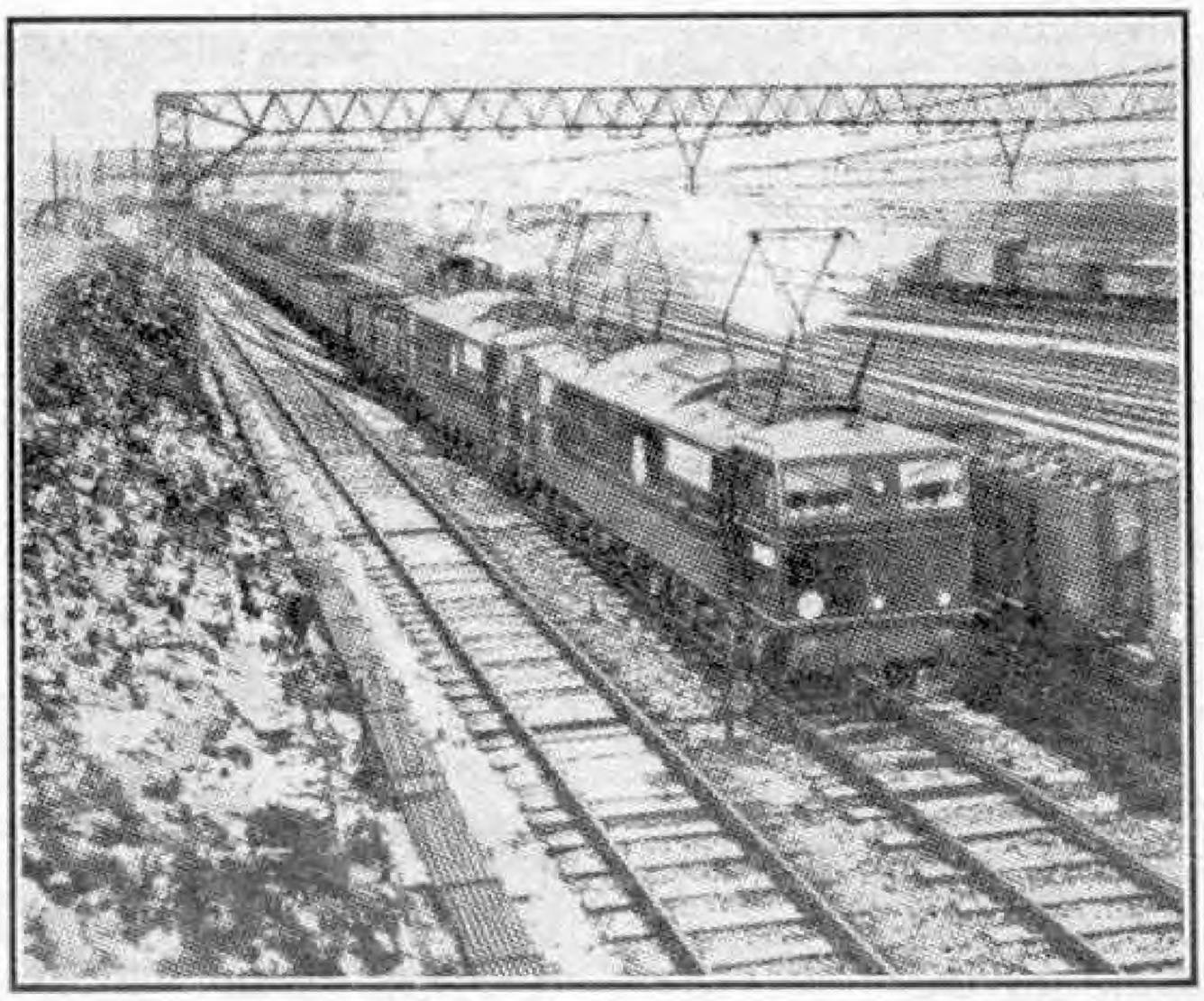
The introductory chapter explains how fish breathe, lists the most suitable sizes of fish for aquariums, and explains the function of the aquatic plants that are an essential part of the equipment. Chapters on indoor fish-keeping tell how to set up the tank and arrange satisfactory lighting and heating, and give general hints on maintenance.

For enthusiasts who prefer outdoor fish-keeping, there are chapters on garden-pond making, stocking and maintenance. Types of goldfish and tropical fish for aquaria are described, and valuable advice given on fish foods and feeding, and on fish-breeding. The book has many excellent half-tone illustrations.

Electrifying A Railway

Wath and Dunford Bridge Section Now In Use

THE *"M.M."* for September of last year included an article on the new Woodhead Tunnel, which is being driven in connection with the electrification of the former L.N.E.R. line between Sheffield (Victoria) and Manchester (London Road), together with the line between Wath-on-Dearne and Penistone and certain branches. The scheme for electrifying these lines was approved by the directors of the former L.N.E.R. in 1936. Preliminary work was well in hand in 1939, including the erection of some of the supports for the overhead wiring, but the outbreak of war brought matters to a standstill, and nothing more could be done until the late summer of 1947. Now the section between Wath-on-Dearne and Dunford Bridge, at the eastern end of Woodhead Tunnel, is in use. This completes the first part of the scheme, which is being carried out in four stages.



A double-headed electric up freight train as seen from Barnsley Junction Signal Box at Penistone. The illustrations to this article are from British Railways (Eastern Region) Official Photographs.

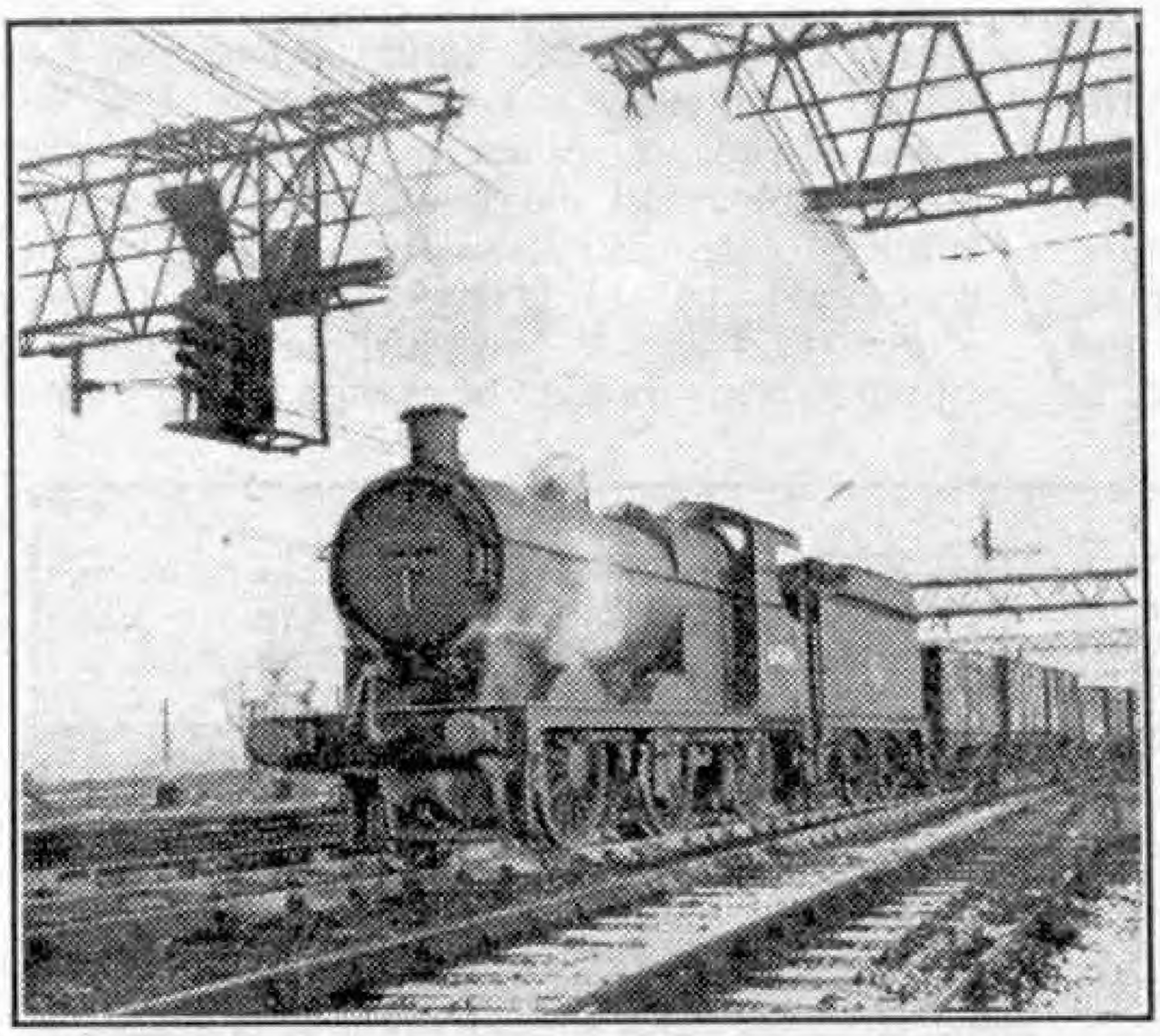
In this great electrification scheme the overhead wire system was decided upon because it has considerable advantages over the third-rail system. It allows higher voltages to be used in safety, with resulting greater efficiency in the distribution of power; and it is also the most suitable system for locomotive operation, since there are no gaps and it provides continuous current collection over points, crossings and level crossings. There is also no interference with the maintenance of the permanent way as compared with the third-rail system, and it is absolutely safe for the staff to work on or about the tracks.

The system really is the only one possible for the operation of freight marshalling yards, as wires can be placed over every track and shunting can be carried out safely. The general appearance of a marshalling yard is greatly altered by electrification on this plan, and the forest of spans and wires in large marshalling yards such as that at Wath form an amazing sight.

Other advantages of the overhead wire system are that snow, ice and floods cannot greatly affect it. Severe weather conditions are experienced on the exposed sections of track over the Pennines, so that it is vitally necessary to use equipment which is most suitable.

The steel bridge structures that support the overhead wires are normally placed at intervals of 210 ft., but this is reduced as necessary on curves. At complicated junctions, and large groups of sidings, compound structures with three or more masts are used, or if space between tracks is not available for masts the equipment is supported on cable head spans attached to tall steel masts on the outsides of the tracks. The return current to the sub-stations is taken through the rails, and each rail joint therefore is provided with a stranded copper bond welded to the rail heads. Special bonding arrangements are made to enable the normal signal track circuits to be operated.

The electric locomotives that are now replacing steam engines are 85 in number and are classed as mixed traffic locomotives. Their mechanical parts are



A down freight passing under a gantry for supporting the overhead wires at Barnsley Junction in charge of one of the ex-Great Central Robinson 0-6-0s, as re-boilered by the L.N.E.R. The gantry also carries colour-light signals.

being built by the railway at their Gorton Works, and the electrical equipment is being supplied by the Metropolitan-Vickers Electrical Company Ltd.

There are two classes of locomotives. Those of the first are of the Bo-Bo or double-bogie, 4-motor type. They have a maximum starting tractive effort of 45,000 lb., a weight in working order of approximately 88 tons, and a maximum speed of 65 m.p.h.

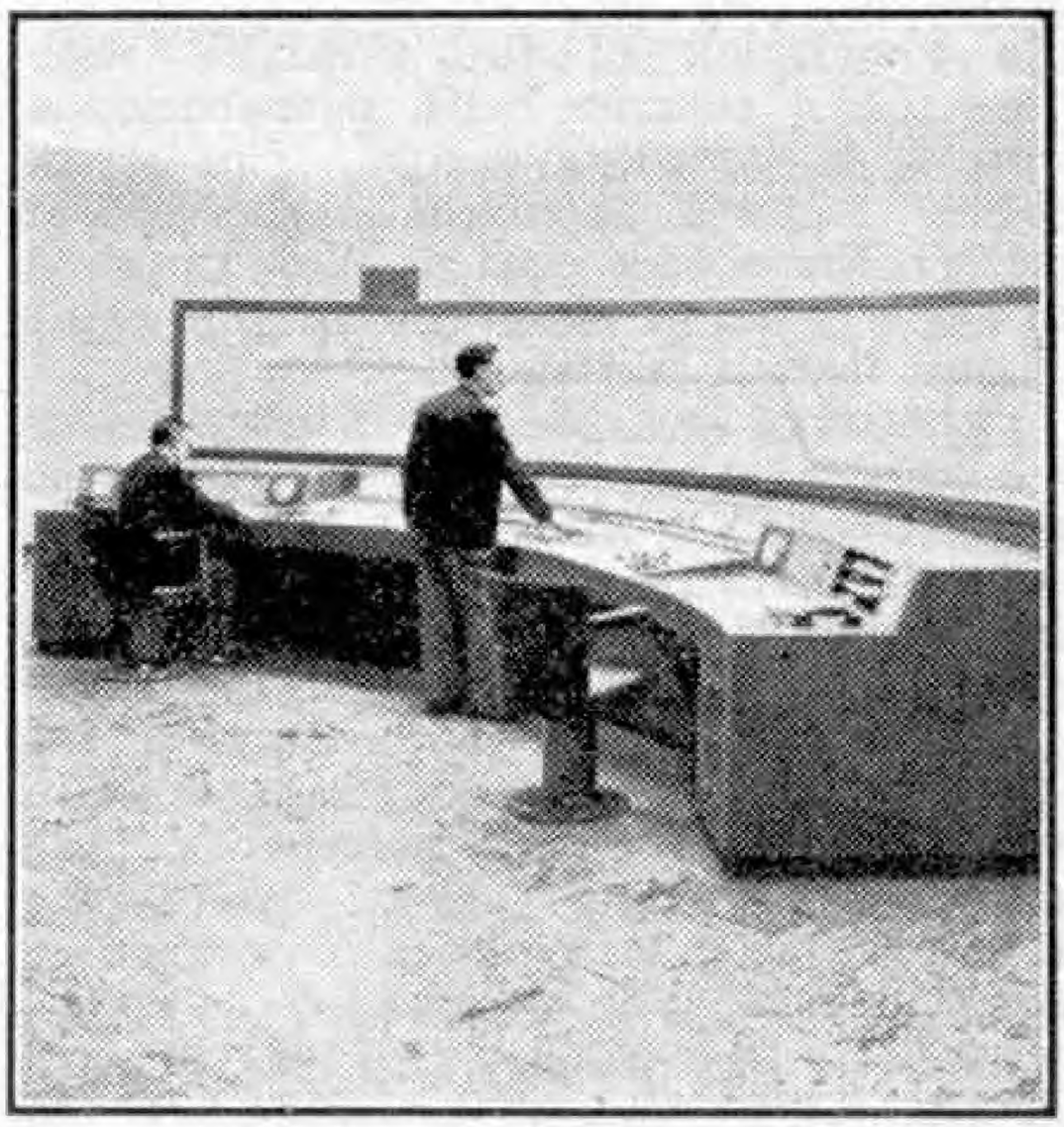
The first locomotive of this series was completed at Doncaster in 1941 to the design of the late Sir Nigel Gresley, and ran trials on the Manchester-Altrincham line in 1941 and 1947. Since September 1947 it has been running in normal service on the Netherlands Railways, hauling 400-500 ton international passenger trains and 1,500-2,000 ton mineral trains. It is very popular with the Dutch operating staff and has run over 200,000 miles. The experience gained with it has suggested improvements and refinements to be carried out in the subsequent locomotives.

The engines, which are numbered 26000 upward, will haul express and slow passenger trains, express and ordinary freight trains and mineral trains. They will also perform banking and shunting duties. Some of them are already at work, looking very smart in the lined black livery of mixed traffic locomotives.

The remaining locomotives, the construction of which will follow, will be of the Co-Co or double-bogie, 6-motor type. They will have a maximum starting tractive effort of 45,000 lb., and in working order will weigh approximately 102 tons. Their maximum speed will be 90 m.p.h. They will be fitted with an electric train-heating boiler and will normally be employed on the haulage of passenger trains.

Both types of locomotive are being equipped with regenerative braking for control of trains on the long grades met with on this section of line. They will also be equipped with electro-pneumatic control gear and Westinghouse straight air brakes, with facilities for the vacuum braking of passenger and freight trains.

The engines have a driving cab at each end, and all controls are conveniently located well within the driver's reach. The Westinghouse brake valve, vacuum brake valve, horn button, vacuum release valve and weight transfer switch are all operated by the driver's left hand. Facing him on an instrument panel, and indirectly illuminated at night, are voltmeters, ammeters, Westinghouse duplex air and vacuum pressure gauges, brake cylinder pressure gauge and indicator lights. The driver operates the master controller, switches for auxiliaries and marker light switches with his right hand, and the hand brake wheel is on the desk at his right. A "dead-man's"



Inside the Electrical Control Room at Penistone, showing the large circuit panels and the control desk.

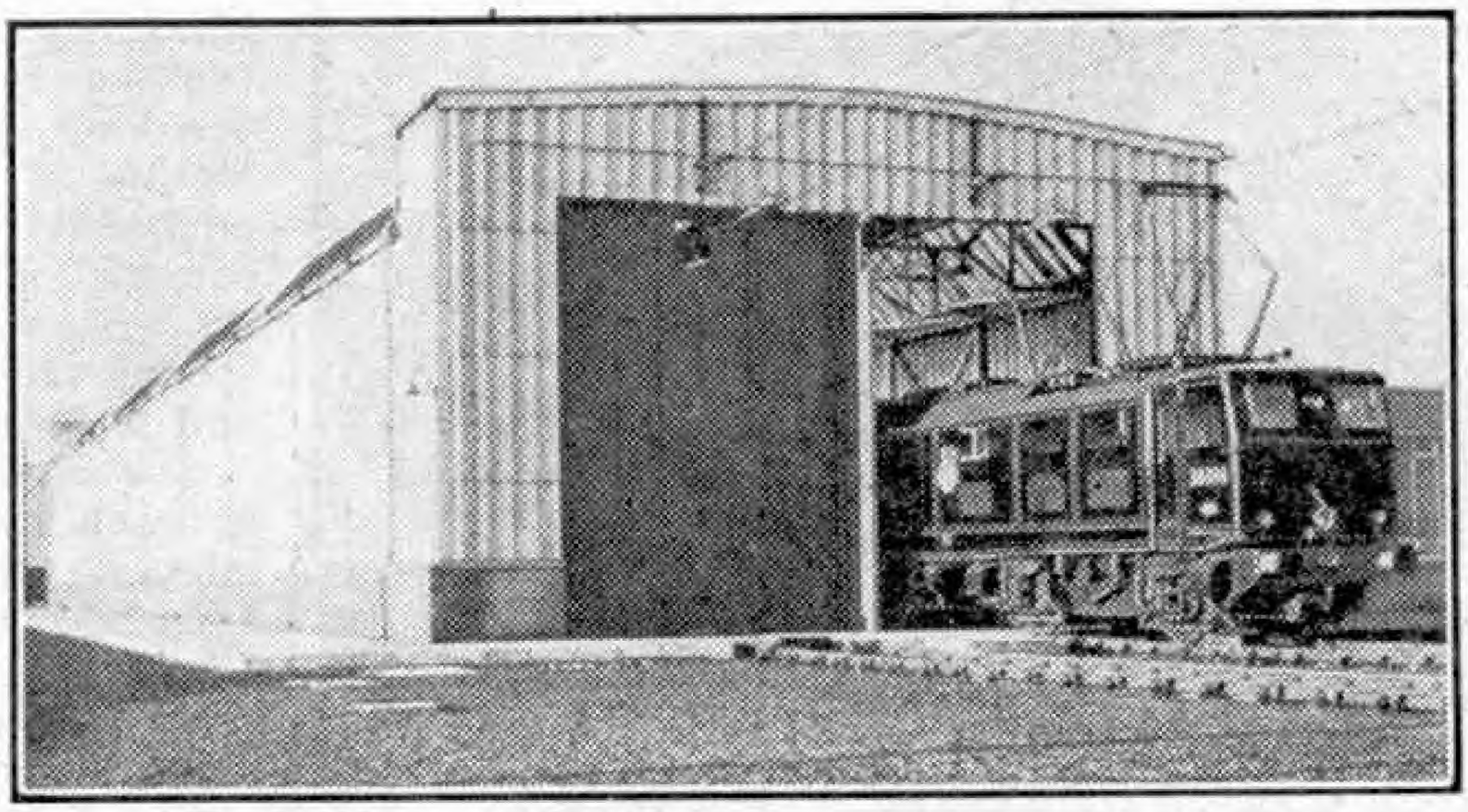
pedal and a foot-operated sanding switch are placed at floor level.

The engines are arranged for left-hand drive. Both cabs, which are similar, have an inward opening door on each side. This is located behind the driver's seat, which is protected by a draught screen. An electric foot-warmer is provided and the left-hand front window is electrically heated for demisting, besides having a power-operated window wiper. There is also a window wiper for the right-hand front window, behind which sits the driver's assistant, but this is operated by hand. A self-locking drop window is fitted on each side of the cab.

A small electric locomotive depot has been built at Wath, and this will be used mainly for the inspection of locomotives. The building accommodates two tracks with inspection pits, which are fitted with fluorescent lighting. As this place will be an exchange point between electric and steam locomotives, a new 70-foot diameter turntable is being constructed nearby. Unfortunately, the land hereabouts is liable to subsidence due to colliery workings, and in view of this difficulty it was decided to construct the foundation of the turntable with pre-stressed concrete with post-tensioned wire to a cartwheel design. This is an entirely novel construction. Special methods have been used to allow the shed to settle without distortion in the event of any further subsidence.

Other civil engineering works necessary on this section of line include the reconstruction of bridges where clearances were not available for electrification, and the building of electrical sub-stations, track-sectioning cabins and a new electrical control room at Penistone. Entering the control room, with its flights of steps, beautifully polished woodwork and concealed lighting, almost gives the impression of walking into a modern super-cinema. The centre piece of course is the control panel. This is of great length, with a diagram of the line between Manchester and Sheffield and the electrified branches above it.

So far as bridges are concerned, some were stone arches, and presented no great problems, except that a few of them from a point east of Oxspring were subject to earth subsidence due to mining. As further subsidence would necessitate lifting the bridge superstructure, it was decided that the opportunity should be taken to provide for jacking this up if it became necessary and to introduce pre-stressed concrete beams with a view to saving steel and future maintenance. When the arches were removed the bridge superstructures therefore were built up to the required minimum clearance of 14 ft. 6 in. and jacking beams were placed on top of the abutments.



Mixed-traffic electric locomotive No. 26014 peeping out of the new motive power depot at Wath. This depot is intended mainly for the inspection of electric locomotives.

The first bridge so altered was at Gilroyd Lane, on the Worsborough branch; it is economical in construction and will go down in history as the first partially pre-stressed, composite construction bridge deck in the world. Sealithor cement replaced Portland, as it was found that this would resist acid and thus permit smoke plates to be dispensed with.

Three tunnels were involved in the first stage of the scheme, two at Silkstone and one at Oxspring. The overhead fixtures in these were provided by setting in the walls old rails bent to conform with the outline of the tunnel roof. The ribs are constructed of two rails welded together, with distance pieces in order to provide space for suspending the hangers for the overhead wires from them.

At level crossings it has been necessary to provide a loading gauge to give warning to road vehicle drivers where the load exceeds the height of the overhead wire.

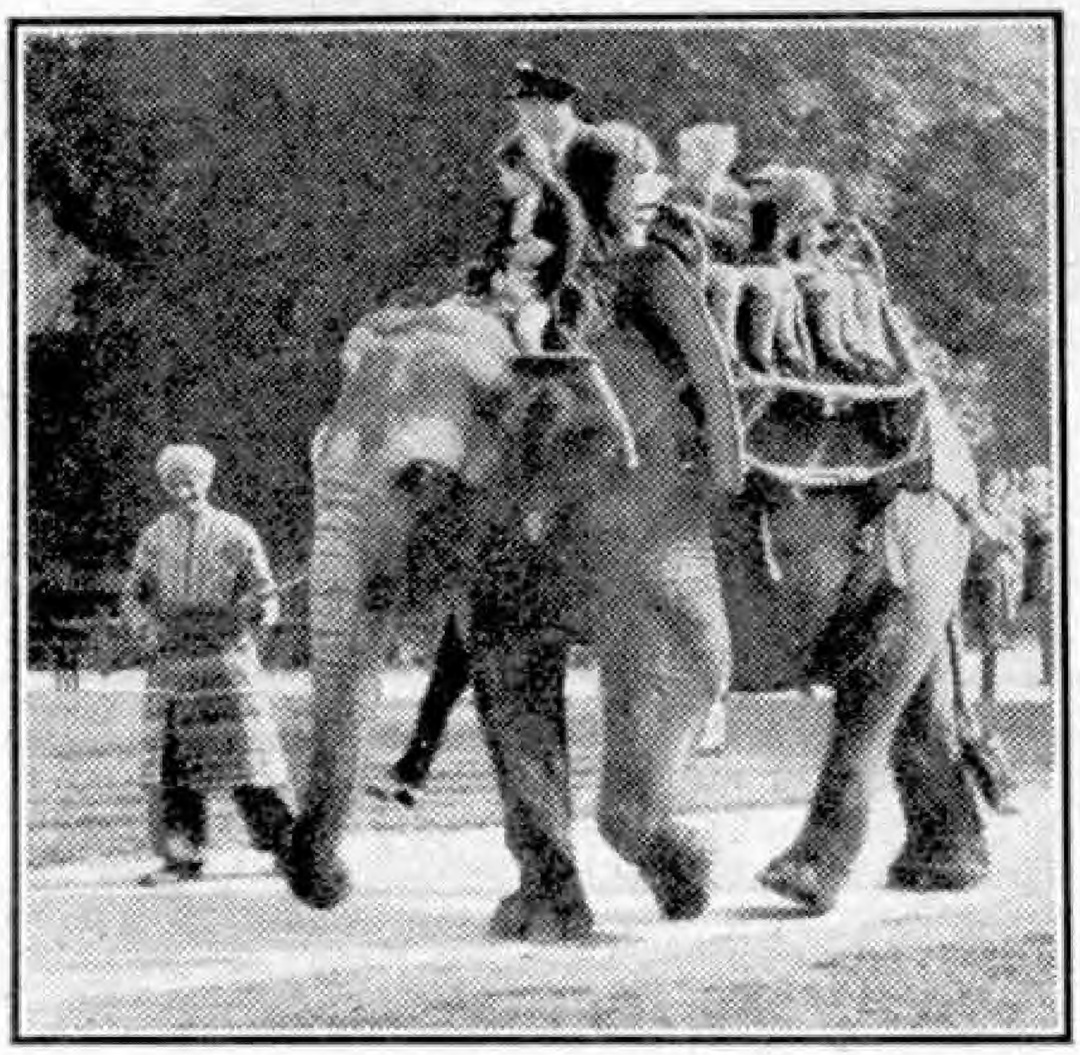
Photography

At the Zoo

By E. E. Steele

NO doubt most people have visited one or other of the various Zoos, which provides an interesting experience for all Nature lovers, and a really exhilarating time for all photographers, for the wild animals make the domestic ones seem rather dull by comparison. My Zoo visits have been at week-ends, when there are crowds of visitors, and I think the choice of a less busy weekday would hold many advantages.

At Whipsnade some of the dangerous animals are

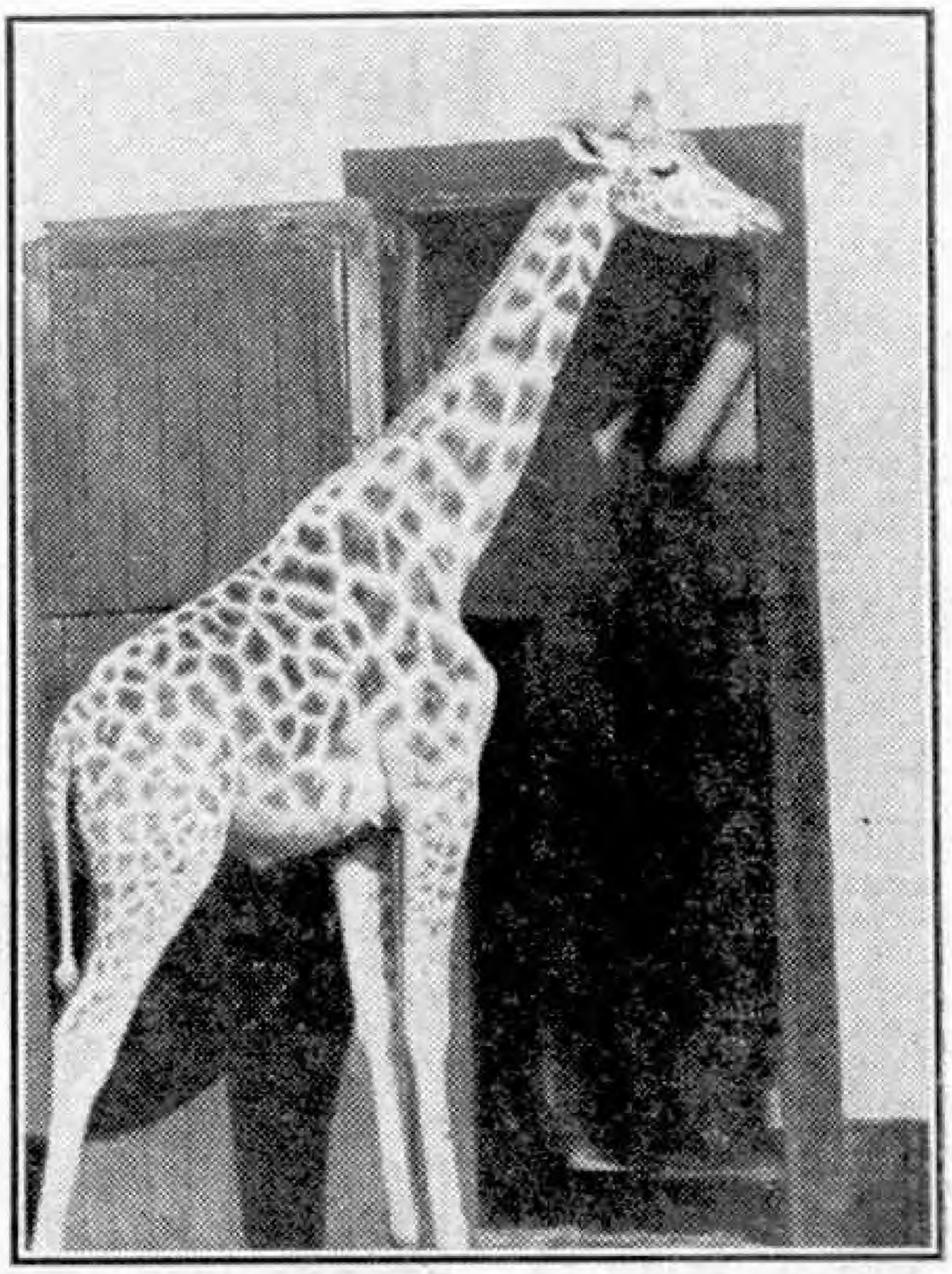


Enjoying an elephant ride.

so placed in deep pits, and surrounded by bars and railings, that it is difficult to do much photography, but there is an abundance of other animals that are quite easy to take. This applies to Zebras and Camels, which have the freedom of grassy enclosures in which they roam at will. Wallabies run about the trees, dodging the visitors, but are wary and difficult to approach. Timber wolves calmly lick themselves within a few yards of the wire netting through which the camera lens is easily pointed. Where there is a single row of bars or netting it is interesting to note that this will not show if the camera is held near to them The bars are so hopelessly out-of-focus that the animal appears to be out in the open.

The elephant, of course, is easy game, as he ponderously steps along with his load of children, and the keeper at Belle Vue very obligingly halts the animal to assist the photographer in getting his picture. The hippos in the pond, protected by low railings, are easy to photograph as they swim along with huge mouths agape, awaiting the tit-bits thrown by visitors. Giraffes are very attractive, but some patience is needed to get a clear shot of them away from the buildings.

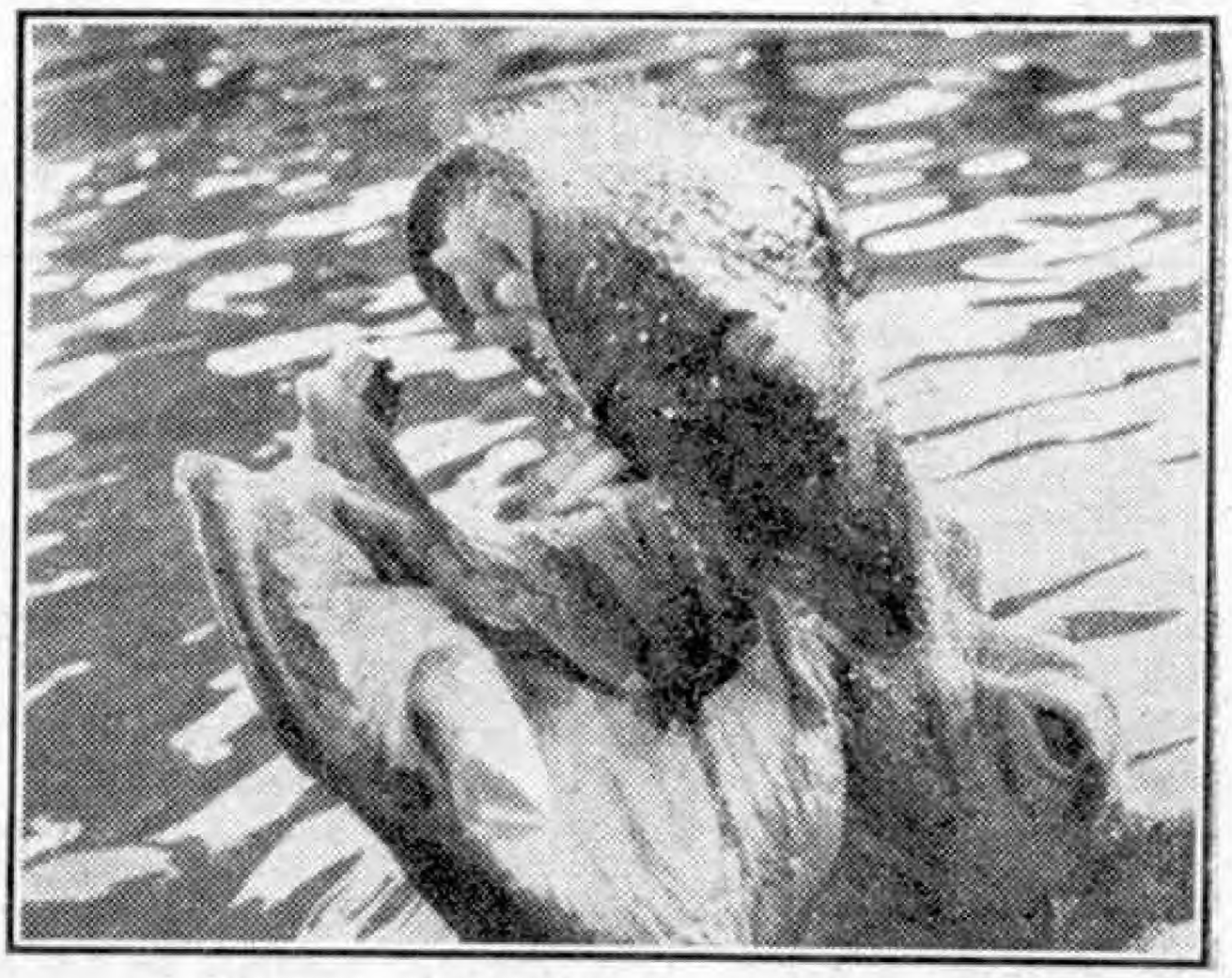
The Zoo Guide, which is illustrated and shows the route to take, also gives the



Giraffe at Belle Vue Zoo. The illustrations to this article are by the author.

approximate feeding times of various animals, which is useful information for such creatures as the sea lions, which are adept at catching fish thrown by the keeper. At Belle Vue sea lions give a performance in a well-lighted interior that is very clever and amusing. Pelicans, cranes, flamingoes, and various other birds add variety to one's Zoo pictures.

Fast film is recommended as being most suitable for covering differing subjects, and making the best of animals in shadowy corners. If one should be lucky enough to possess a telephoto lens there will be ample opportunity to use it in getting close-ups of distant animals, but it's use is by no means essential to successful Zoo pictures.



Hippopotamus at Belle Vue soliciting food.

Air News

By John W. R. Taylor

First Delta Fighter

Britain's lead in jet-'plane development has become even greater following the first flight of the Gloster G.A.5 delta-wing fighter, illustrated below. It is the world's first operational delta and one of the fastest aircraft in the sky, but no details of its construction or performance may be given yet, except that it has two of the tremendously powerful Armstrong Siddeley "Sapphire" turbojets.

Like the recently announced de Havilland 110, the G.A.5 is a two-seat, multi-purpose fighter, equipped with the latest types of radar and armament, and designed to search out and destroy fast enemy atom-bombers by day or night in all weathers.

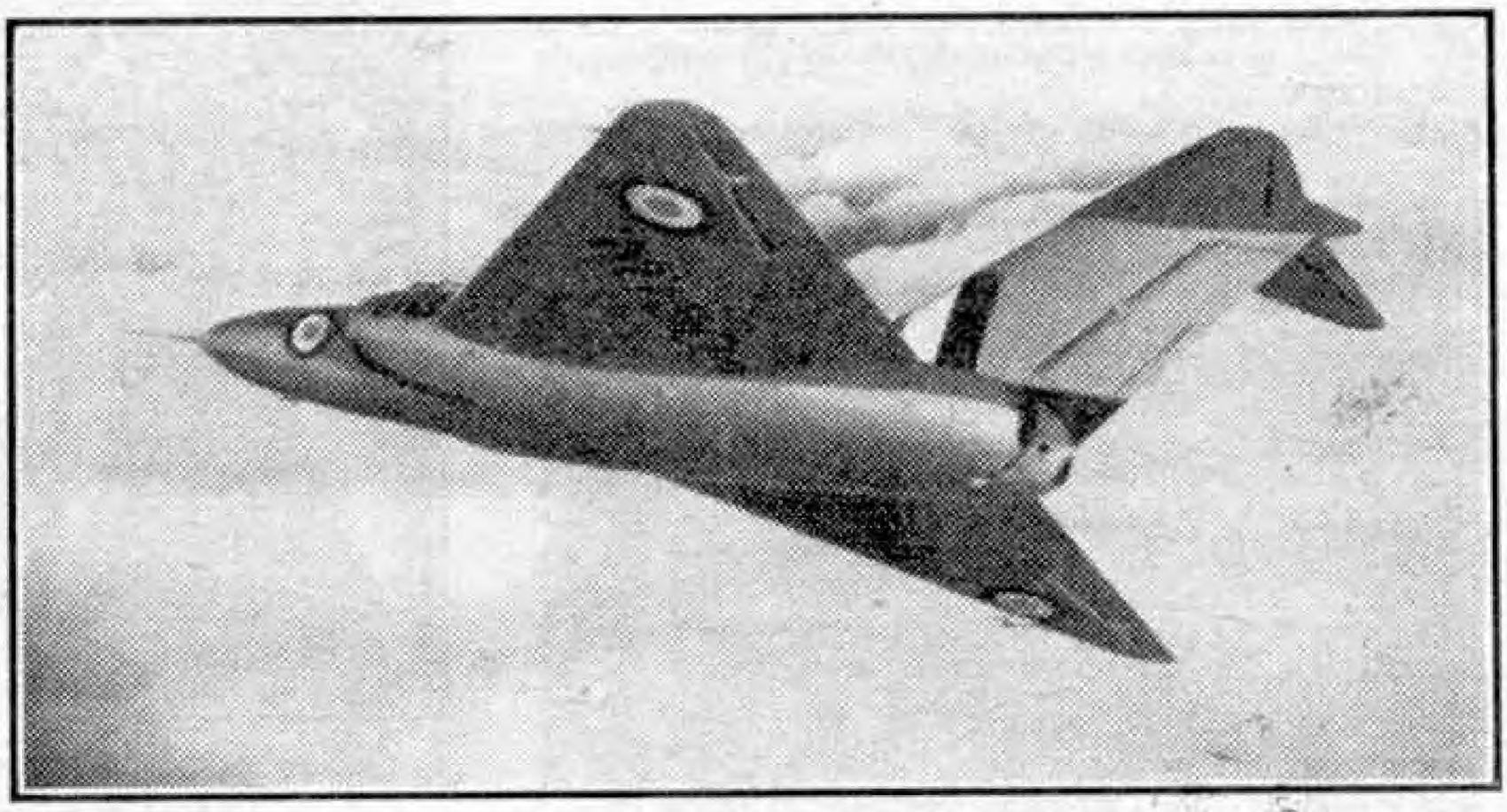
Armchair Flying

A young Frenchman named J. Lecarme has invented an unusual system of controls to replace the normal joystick or control wheel on high-speed aircraft. It is being tested in the SE.2410 "Grognard" twin-jet fighter and consists basically of two armrests fitted to the pilot's seat. At the end of each arm is a handle which the pilot grasps; and the aircraft's control surfaces are moved by connecting rods pivoted under his elbow and behind his shoulder. The pilot's arm motions are almost the same as with conventional controls, but the sytem takes up less room and is much easier to operate.

Keeping Cool

To keep passengers cool while flying through the tropics, Lockheed's new "Super Constellations" have in their wings, as part of the air-conditioning equipment, two anti-heat units which equal the cooling power of 340 home refrigerators. Their capacity is 17 tons of refrigeration, equal to the cooling effect of 17 tons of ice melting completely in 24 hours. As a result, the "Super Connie's" cabin temperature remains in the 70's, even when it is 100 deg. in the shade outside.

At the other end of the scale, heating equipment is fitted to keep the cabin air at 75 deg. in high altitude temperatures as low as minus 60 deg.



Gloster G.A.5 delta-wing twin-engined fighter, the world's first operational delta aircraft. Photograph by courtesy of the Gloster Aircraft Co. Ltd.

Periscopes for Air Liners

Astrodomes, the Perspex domes on the top of aircraft through which navigators take sextant readings from the sun and stars, may soon be things of the past, as many modern aircraft are being fitted instead with a device like the periscope of a submarine.

Chief disadvantage of astrodomes was that they stuck up in the airflow and spoiled the aircraft's streamlining, whereas the new periscopes need only be raised when the navigator wants to take a reading. In addition, there was always the possibility of damage to an astrodome in high-altitude pressurised aircraft. In 1949, for example, an air liner flying in mid-Atlantic lost its astrodome, and in the sudden fall of pressure the unfortunate navigator was sucked out of the aircraft into the slipstream.

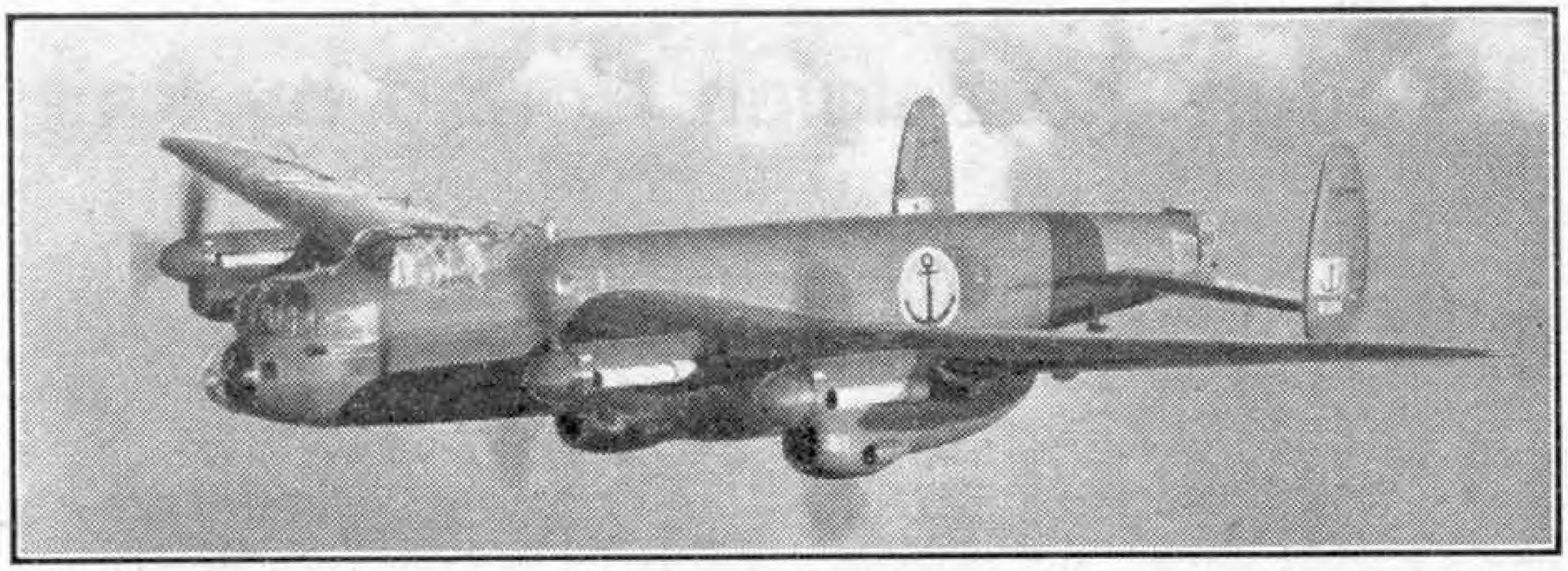
The periscopic sextants, which are already fitted to the "Comet," "Hermes" and "Stratocruiser," slide through special hatches in the fuselage and are electrically heated to prevent misting or ice-up. They are made in Britain by Kelvin and Hughes Ltd.

"Twin Bonanza"

Following the success of their popular butterfly-tailed "Bonanza" four-seat light 'plane, Beechcraft have put into production a twin-engined six-seater on the same lines, named the "Twin Bonanza." As can be seen in the accompanying photograph, it retains the "Bonanza's" good looks; but its two 260 h.p. Lycoming engines give it an even better performance, with a cruising speed of 191 m.p.h. and range of just over 1,000 miles.

The "Twin Bonanza" was designed as a rugged, multi-purpose aeroplane, equally suitable as a civil executive and air taxi machine or for military training, photographic, ambulance and cargo duties.

The Beechcraft six-seater "Twin Bonanza" described on this page. Photograph by courtesy of the Beechcraft Aircraft Corporation, U.S.A.



One of the newly converted general reconnaissance Avro "Lancasters" for the French Naval Air Arm. Photograph by courtesy of A. V. Roe and Co. Ltd.

"Lancasters" for French Navy

The Avro "Lancaster" shown above is one of 54 which are being reconditioned by A. V. Roe for the French Naval Air Arm. They will operate from bases in French North Africa, to help R.A.F. Coastal Command in its task of protecting vital shipping routes through the North and South Atlantic and in the Mediterranean.

The aircraft are basically "Lancaster" Mk. 1 and Mk. 7 bombers, and conversion for reconnaissance duties includes installation of much specialised equipment, including ASV search radar. Extra tanks are fitted in the bomb-bay to make possible long patrols, and a suspension hook is provided so that the aircraft can carry an airborne lifeboat under their fuselage for air-sea rescue missions.

Japanese Airline

Following the signing of the Japanese Peace Treaty, Japan has been allowed to re-establish a national airline. So far its routes are restricted, as are the number of flights, and the company have not bought any aircraft of their own. Instead they have hired two 44-passenger Martin 2-0-2s and one 61-seat Douglas DC-4 from Northwest Airlines of America. But if all goes according to plan, Japan Air Line will extend their services as soon as possible to Australia, Hong Kong and Singapore.

B.O.A.C. get their First "Comet"

The first of B.O.A.C.'s fleet of de Havilland "Comet" air liners, G-ALYS, was handed over to the Corporation early in February last, six months ahead of the contract date. A short time before, the Minister of Civil Aviation had ended the "Comet's" experimental days by signing and delivering to de Havillands its Certificate of Airworthiness, the first ever granted to a jet air liner. This signified official approval for "Comets" to carry passengers in worldwide service.

Life-Saving Torpedo

Douglas Aircraft have developed an ingenious air-sea rescue "torpedo," containing an automatically inflated eight-man life-raft, four-cylinder engine, fuel for 300 miles, radio, heating equipment, survival kit and an eight-day supply of food. In appearance it resembles an ordinary explosive-carrying torpedo, except for its blunt nose; and it is said to be radio-controlled, so that, after entering the water, it can be guided in the direction of a ditched aircrew.

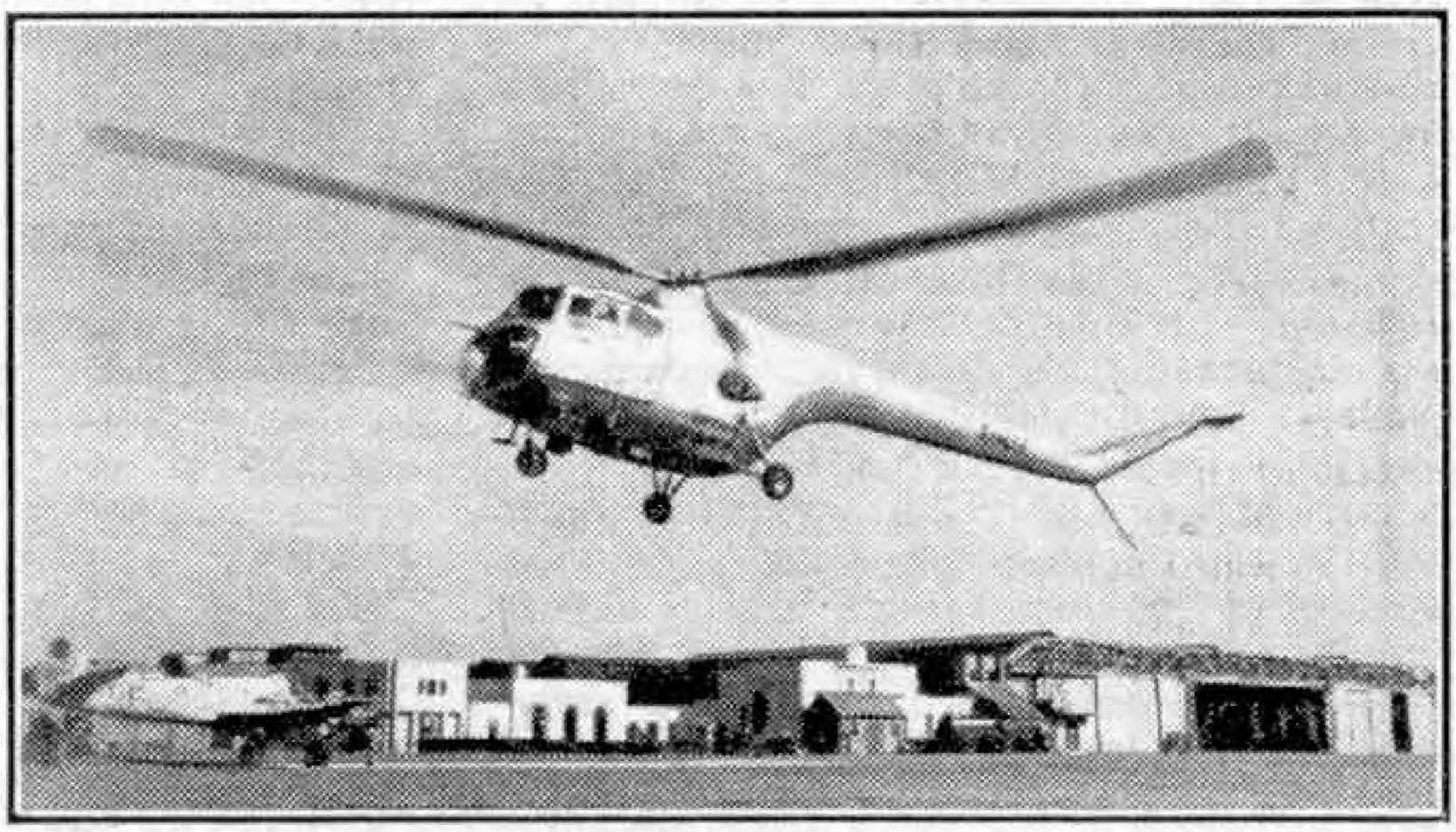
"Solent" for Aquila

Aquila Airways, the only airline operating flying boats from the United Kingdom, have bought a 41-seat Short "Solent" to augment the fleet of "Hythe" 'boats used on their Southampton-Madeira service. The new aircraft is named "*Sydney*," and prior to its purchase by Aquila had flown only seven hours in service—six of them as an R.A.F. "Seaford" patrol bomber and one hour with B.O.A.C. after its conversion into a "Solent" luxury air liner.

Record Charter

An Avro "York" of Eagle Aviation Ltd. has completed the longest air charter flight ever undertaken by a British private operator. Leaving London on 6th December last year, it carried six tons of Christmas mail for troops in the Far East, including Korea, travelling via Malta, Nicosia, Bahrein, Karachi, Calcutta, Bangkok and Manila, to Iwakuni, Japan.

The "York" then flew on to Hong Kong to pick up 30 Philippine seamen and one U.S. officer destined for Brazil. It made the journey to Brazil via Rangoon, where crew and passengers spent Christmas day, on through Calcutta, Karachi, Aden, Khartoum, Kano, Dakar, across the South Atlantic to Natal, then on to Rio de Janeiro and Porto Alegre. On its return to Luton Airport it had covered 31,750 miles.

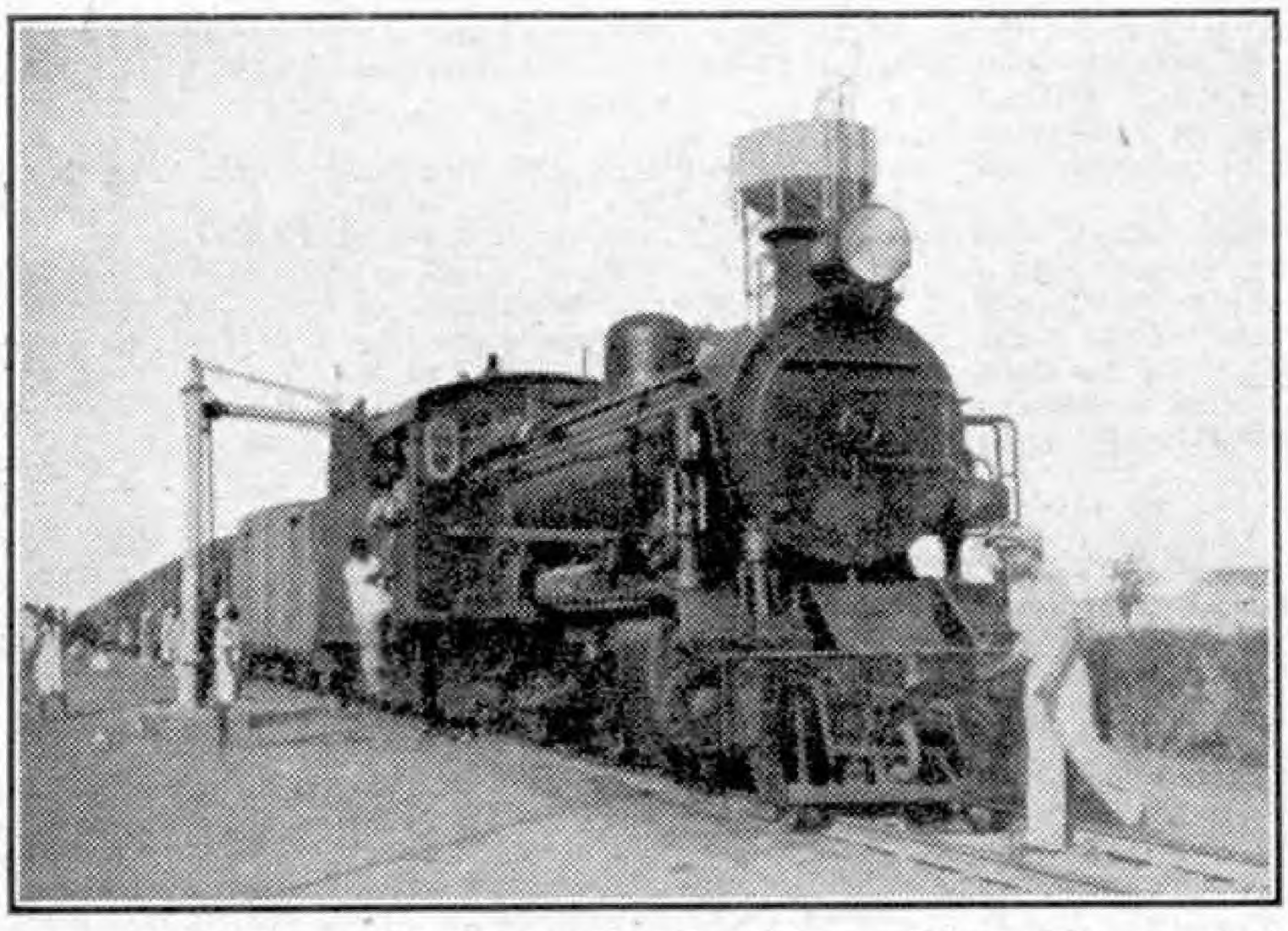


Bristol Helicopter 171 in the air. (See special article on page 169). Photograph by courtesy of The Bristol Aeroplane Co. Ltd.

Through the Belgian Congo by Rail

By D. M. S. Fairweather

LAST month I described the journey from Nairobi by rail to Kisumu, then by steamer to Mwanza, and then by train again to Tabora. From Tabora to Kigoma, on the eastern shore of Lake Tanganyika, was another overnight journey, and arrival at the latter was early on the Thursday morning, the train running alongside the quay. This was very neatly laid out, with the tracks between rows of shrubs and palm trees. There were several vessels in the harbour; the T.R. steamer "*Liemba*," which plied southwards along the eastern side of Lake Tanganyika to Mpulungu in North Rhodesia, and three ships of the Compagnie des Chemins de Fer du Congo Superieur aux Grands Lacs Africains, better known as the C.F.L., which operates traffic between Kigoma and the Belgian Congo. We embarked on the "*Duc de Brabant*" of this company and set sail for Albertville, a pleasant voyage of eleven hours, chiefly noted for the excellent meals served on board.

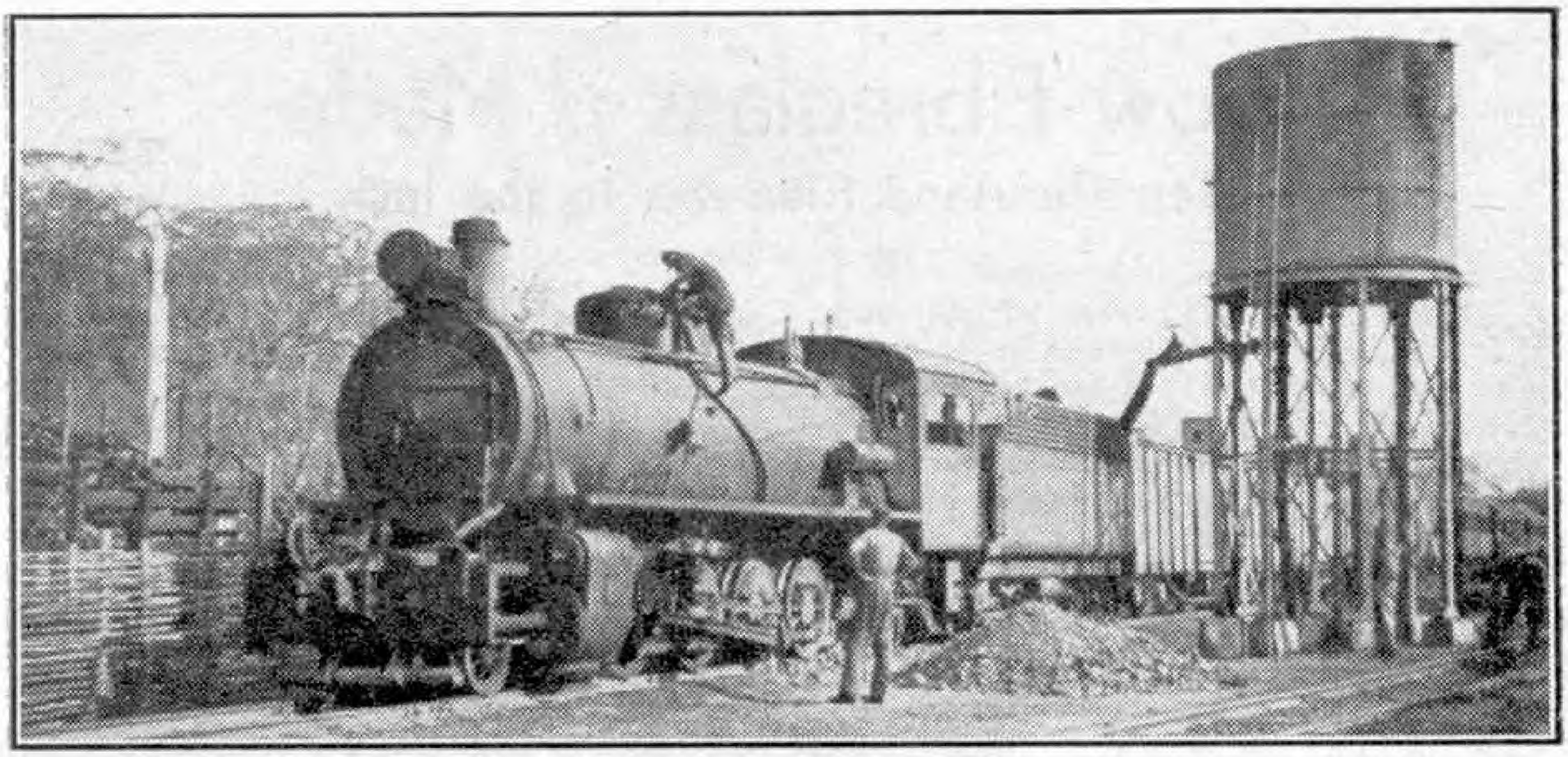


Tanganyika Railways 2-8-2 locomotive No. 402 on a Tabora-Kigoma mixed train at Usoka.

Arrival at Albertville was after dark and it was impossible to make a detailed survey of the locomotives in the depot. These included some old 2–6–0s and 0–6–0s, some with side tanks as well as tenders, and an American-built 2–8–2 delivered in 1943. We had two hours for a meal before boarding the train for Kabalo; the engine provided was No. 52, a wood-burning 2–8–2 of Belgian manufacture, with a hooter rather reminiscent of the Caledonian. By 7.30 next morning we had covered the 273 km. to Kabalo, a station on the banks of the Lualaba, as the upper reaches of the River Congo are known. The district was swampy and the atmosphere hot and damp, just to make the traveller feel that at last he was in the wilds of Africa; but this illusion was quickly dispelled on dismounting from the train and finding a pleasant, modern station complete with baths, and soap and towels available on application to the Chef de gare.

We crossed the river on a ferry, actually a flat barge lashed to the side of a small and aged steam tug. We nosed our way across the river up a channel in the swamps, passed the local District Commissioner seated in a dug-out canoe paddled by two Africans, and arrived at the end of a causeway built out over the swamp. Then followed 450 km. by road in 7½ hours, inclusive of stops, to Kamina, a town on the Chemins de Fer du Bas Congo au Katanga, or B.C.K., where we had a welcome rest of 27 hours until the departure of the next south-bound train.

This 3ft. 6in. gauge railway was formed by the amalgamation of two companies, the Chemins de Fer de Leopoldville, Katanga, Dilolo, and the Chemins de Fer Au Katanga, and the respective initials L.K.D. and C.F.K. of these companies are still carried on the locomotives and rolling stock. This line makes an end-on connection with the Rhodesian Railways at the Northern Rhodesian border. At Kamina there was a running shed and repair shop, and most of the locomotives there were 2–8–2s, with a few older 4–8–0s, and a small 0–6–0T as station pilot. For our train, which left at 9.30 on the Saturday evening, a 2–10–4 No. 801 appeared. This engine



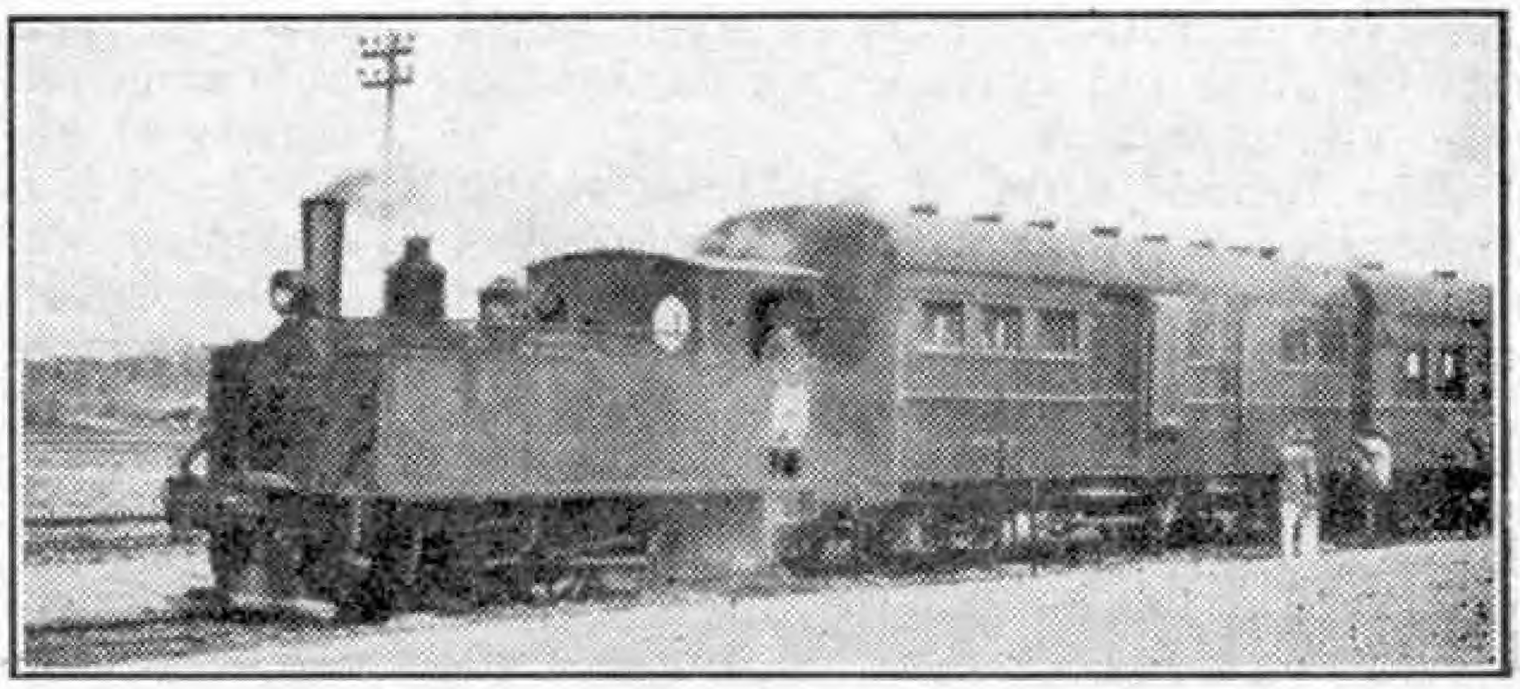
B.C.K. 2-8-2 locomotive No. 411 at Kalule Nord, Belgian Congo, with a Kamina-Elisabethville train.

was wood-burning, and in its large cab the African driver had four bare-footed firemen to feed two fire-hole doors. From Kamina to Elisabethville took 24 hours. The journey of six hundred kilometres of curves and hills is if anything more exhausting to the traveller than to the locomotives, which attacked the gradients with a careless abandon slightly frightening on the sharper curves.

Engines were changed several times; at Bukama, where we recrossed the Lualaba river on a long viaduct, a 2–8–2, No. 411, came on and ran to Lubudi, where it was replaced by No. 401, a coal-burning engine of the same class. There also a restaurant-car was added to the train, and this was very welcome as it was then 10.30 a.m. The line continued climbing, and after crossing a summit altitude of nearly 5,250 feet we dropped down into Tenke, the junction with the line westwards to Dilolo and thence by the Benguela Railway to Lobito Bay on the west coast of Africa. There No. 401 was exchanged for No. 468, a 2–8–2 of a different class.

The B.C.K. line is single throughout, with crossing loops at stations. Each station has a home semaphore signal, not unlike the old G.N.R. "somersault" signals, at the entrance to the station limits, and a distant warning board, circular and painted half white, half green, at least half a kilometre in advance. All the points were hand-operated, and the driver exchanged the single-line tablet with the pointsman at the entrance to the station. If there was no business to be done the train ran through without stopping. It came as rather a surprise when approaching Jadotville, one of the most important towns in the Belgian Congo, to see a double track triangular junction, signalled and controlled from a central cabin. Jadotville station was a modern, single-platform station, and there our 2–8–2 was replaced by No. 702, a 4–8–2 built in Liege in 1938.

The last section of the run with this train, to Elisabethville, was in darkness, and it was not possible to see anything of the station and workshops at that point. About midnight we left there on a mixed train, and at six the next morning ran into Sakania, the last station in the Belgian Congo. There (*Continued on page 190*)



A quaint 0-6-0 side tank, B.C.K. No. 5, at Kamina.

How Fibreglass is Made

Ten Thousand Filaments to the Inch

By W. H. Owens

GLASS appears in one of its most remarkable forms when it is drawn into very fine fibres that can be spun into thread and woven in a similar way to wool or silk. Great technical advances have been made with fibrous glass in recent years. It has many and various applications in industry, but is used chiefly as an insulating material in the electrical and building trades, in ships, aircraft, railway locomotive boilers and rolling stock, and such domestic equipment as cooking stoves and refrigerators.

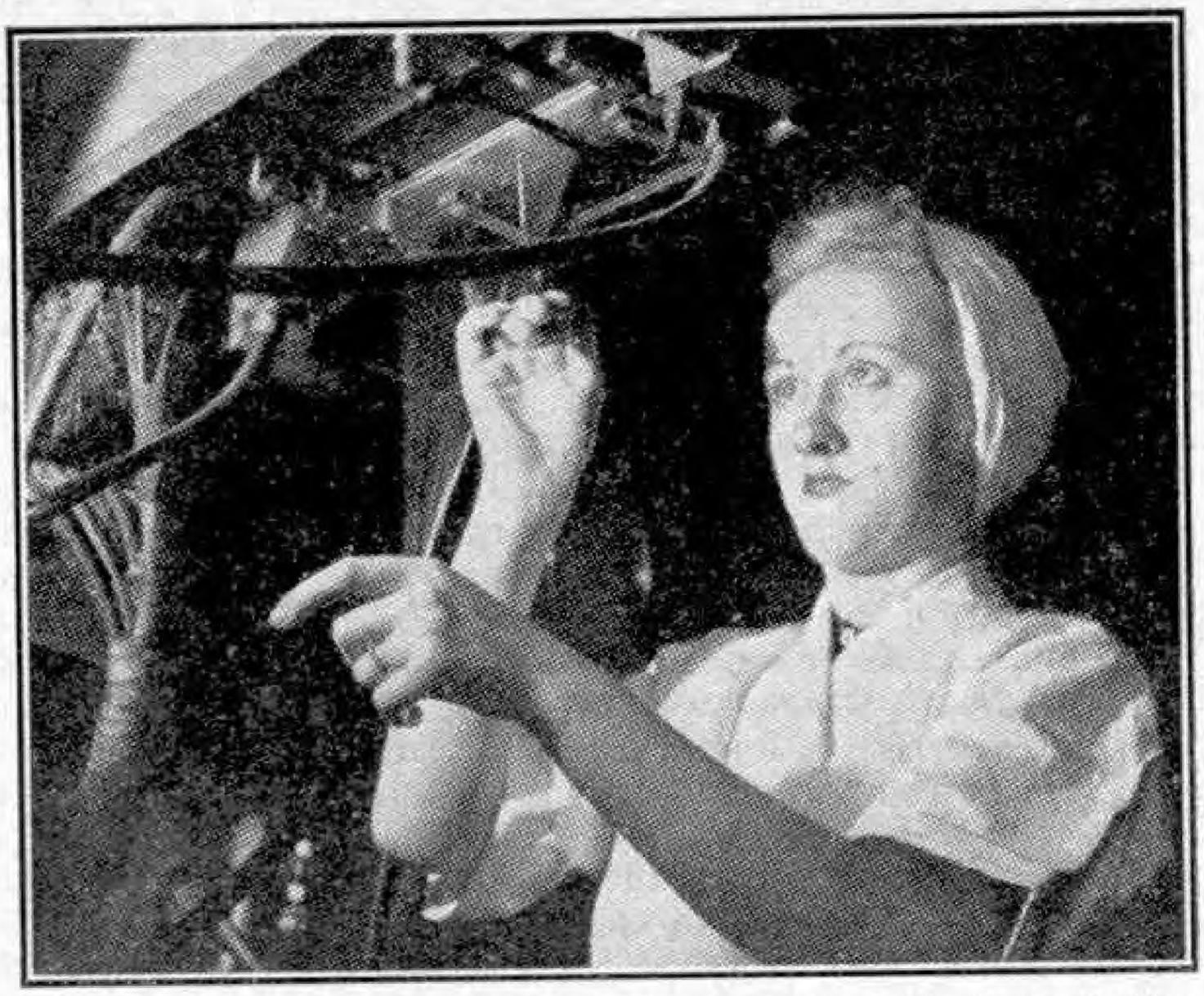
"Fibreglass" is very different in appearance from ordinary glass, but it has many of the qualities of the latter besides a number of others that are peculiar to itself. Each individual fibre, though much finer than a human hair and far stronger than silk, is actually a solid rod of glass produced, in the initial stage, by the usual method of melting the raw materials together in a glass-making furnace.

Apart from its fineness and high tensile strength, Fibreglass has many other advantages as an insulating material. It has a high heat resistance and will not burn, a quality, by the way, that makes it a valuable source of fireproof cloth for many purposes. It is an excellent electrical insulator, and resists both weathering and the corrosive effects of most acids. Its lightness and space-saving advantages also are important.

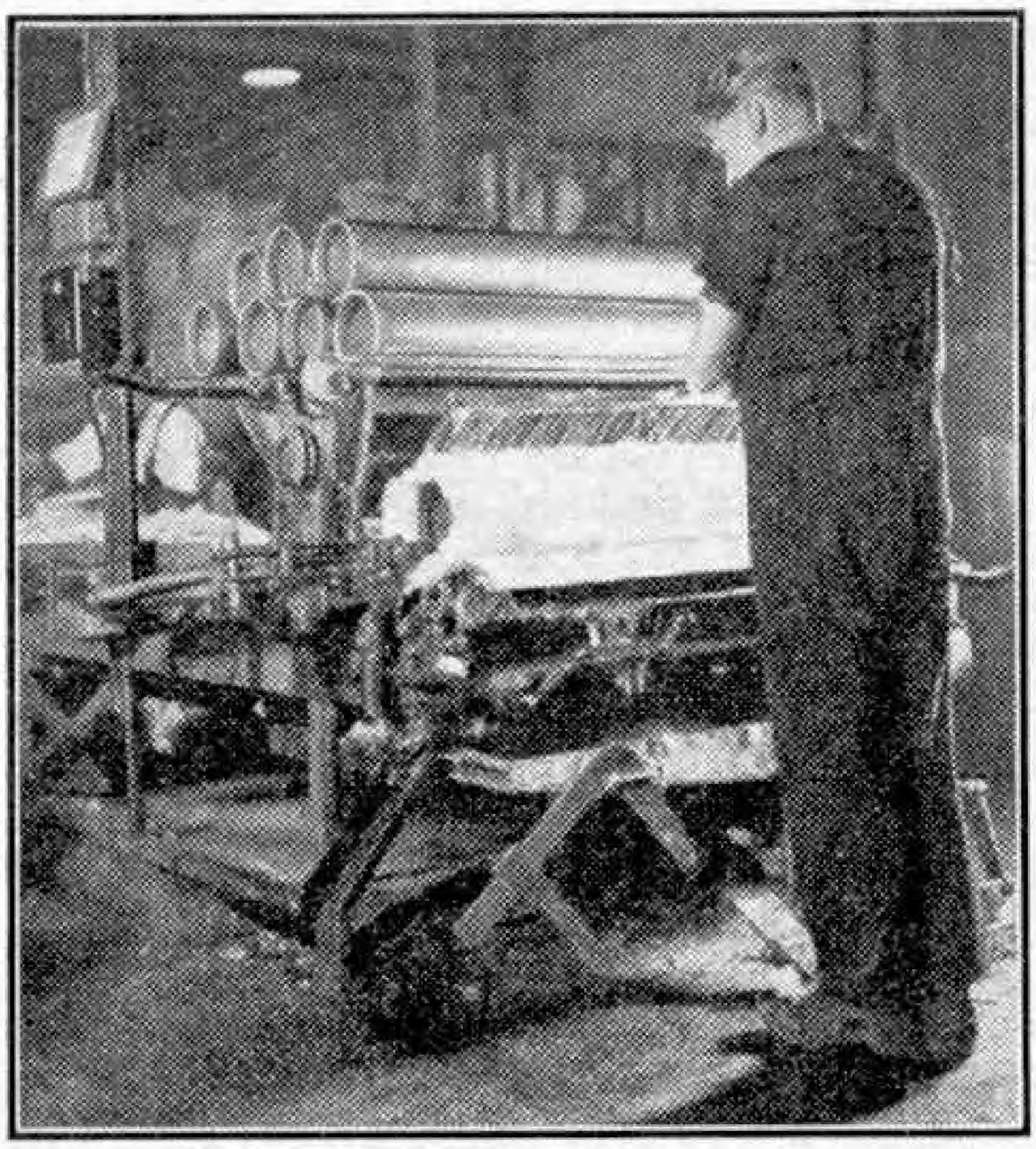
The lightest form of insulation so far discovered is a Fibreglass product known as superfine fibre mat. It consists of millions of very fine glass fibres lightly bonded with plastic resin. The individual diameter of these fibres is less than one ten-thousandth of an inch, and it would take as many as 500 of them to make a microscopic bundle equal to the thickness of just one human hair! Because of its extreme lightness, superfine fibre mat is now used as a complete wrap-around against heat or cold and noise in the fuselages of many British air liners.

Fibrous glass development on a commercial scale dates from the first World War, when the Germans began making it as a substitute for asbestos, supplies of which were denied to them by the Allied naval blockade. Nearly a hundred years earlier, however, a British patent had been taken out for the use of this same material in lamp wicks, a purpose to which it is still put to-day. Later in the nineteenth century a wedding dress was actually made from glass fibres, but while modern fibrous glass has a variety of useful purposes as an industrial textile, it is not at present a rival of silk, cotton or wool for clothing manufacture.

The methods used for producing the fibres were very crude in the early days. Thick glass rods were heated to melting point over a flame and then the threads were pulled off by a drawing-drum operated by means of a pedal. Later this process was speeded up by the installation of electrically-operated drums, and eventually the threads were drawn off by mechanical means direct from the melting furnace.



Drawing glass fibres from the bottom of a furnace to begin the production of continuous filament. The illustrations to this article are reproduced by courtesy of Fibreglass Ltd.



White bat wool formed on a mandrel being sprayed with a binding agent.

Modern Fibreglass is produced in three principal forms—as glass wool, which is known as "bat," as continuous filament glass yarns and tapes, and as staple fibre. The last two are used as textiles.

In the bat wool process the molten glass is passed from the furnace through a number of very fine holes, and the tiny glass streams so produced are then drawn into long, thin fibres by steam blast. This steam blast method of drawing was invented in America about twenty years ago and resulted in a big advance in output and in the fineness of fibres produced.

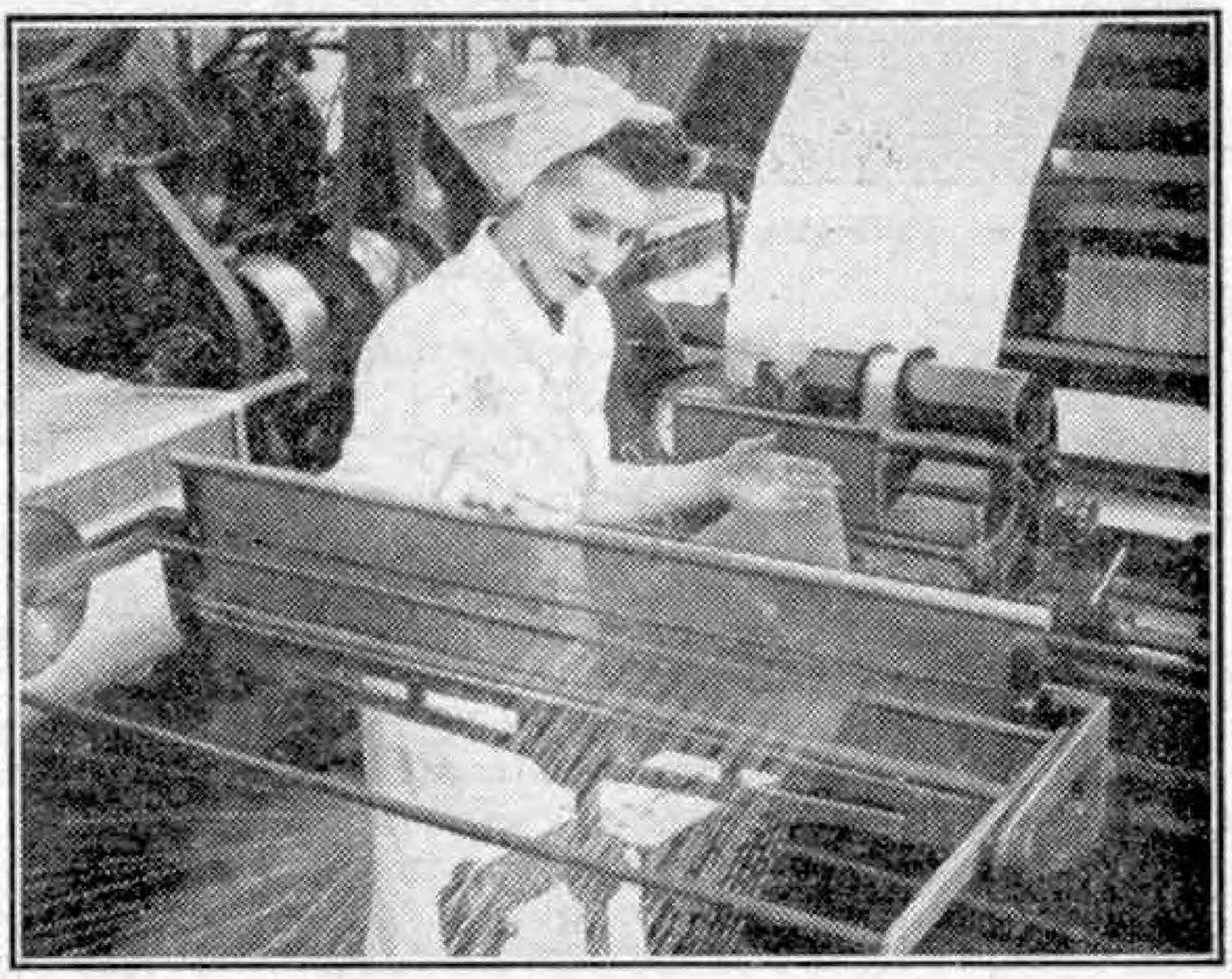
As the fibres are drawn, they form a snowy, white wool mat about 10-in. thick on a conveyor belt. The mat is passed along to be compressed to the desired thickness and cut to the required sizes.

This bat wool is a basic material from which many glass wool products can be made for heat, cold and sound insulating in buildings, aircraft, ships, railway carriages and so on. It is used either as a loose fill, as flexible matting, or, bonded with resin or bitumen, in semi-rigid and rigid board form. Sewn-up sheets of bat wool are very widely used in industry now for the lagging of boilers, ovens or large diameter pipes.

Bitumen-bonded Fibreglass was in great demand just after the war, when it played an important part in the roofing and wall insulation of prefabricated houses all over the country. It has also been used as a sound-deadening layer between the floors of new blocks of flats, and for sound correction in B.B.C. studios, the Royal Festival Hall on London's South Bank, the new House of Commons and the new Free Trade Hall in Manchester. Bitulac-bonded Fibreglass is used in domestic refrigerators and in the food cabinets of shops and restaurants.

Then in the form known as Rigid Sections, bat wool is used for the insulation of pipes in factories, hospitals and schools. These sections have great strength, light weight, long life and high efficiency in heat saving, and they can be much thinner than any other material used for the same purpose. For making Rigid Sections the loose bat wool is sprayed with a binder, rolled by machinery to the proper shape and size, and finally dried to form an efficient lagging.

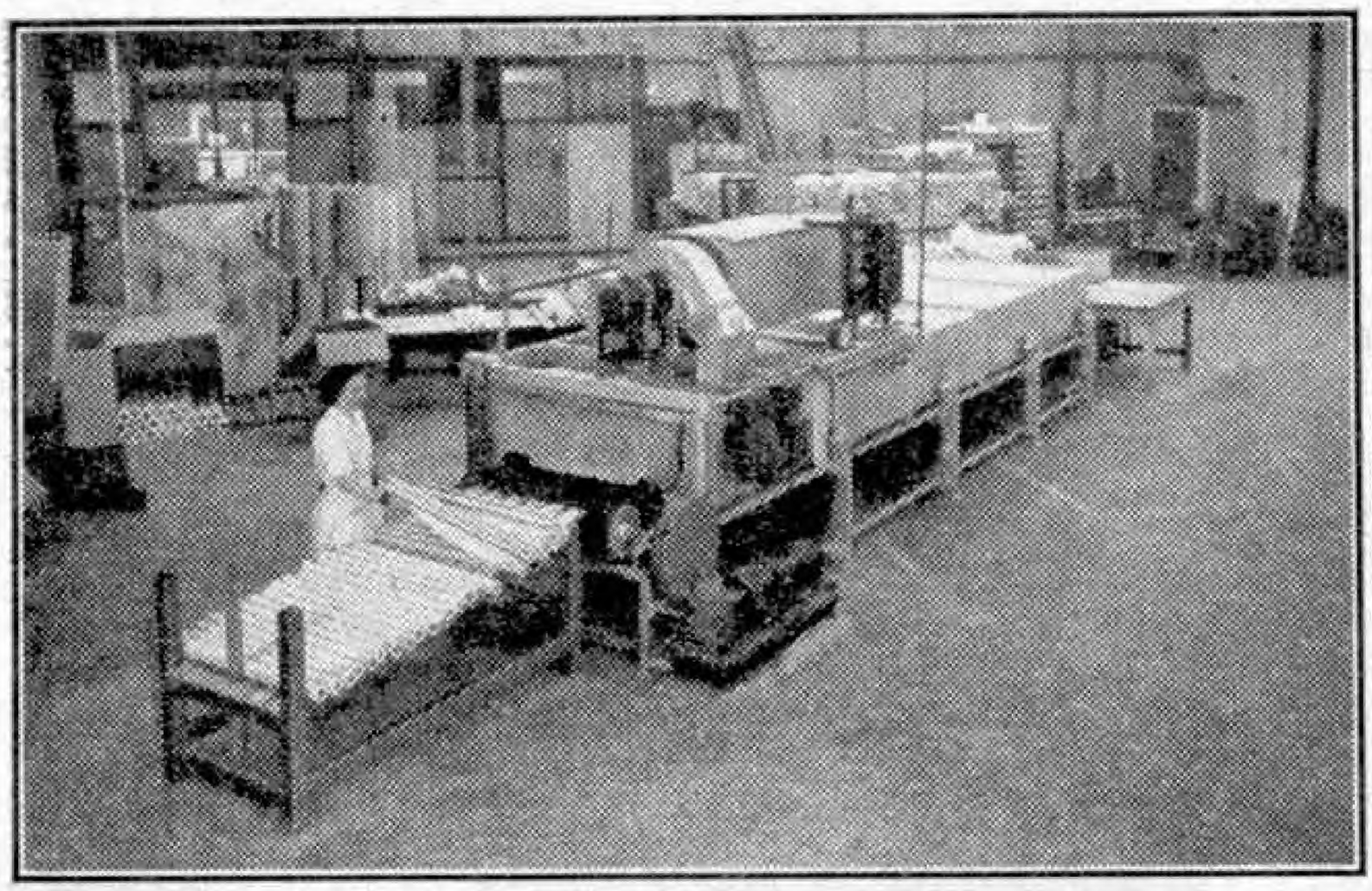
The process for continuous filament is quite different from that for bat wool. This time the glass is moulded into ordinary marbles. The marbles are then fed one at a time into a small, electrically-heated furnace that has over one hundred



Glass fibre yarn passing through the leasing reed in the process of warping yarn.

holes at the bottom. When the glass reaches the holes it is cooled down, and the slightly more viscous material is teased through the holes and drawn down vertically. The resulting threads are next passed over a lubricating pad, which applies textile size, and are attached to a fast-moving spindle placed immediately under the furnace. From this stage onward the process is similar to that used in normal textile manufacture.

Fibre made of the individual filaments is wound on to the spindle at the rate of about 6,000 feet a minute, and just one marble, three-quarters of an inch in diameter and weighing only a third of an ounce, produces over a hundred miles of individual filament. In other words, the process of making continuous glass fibres consists in changing a glass marble into a hundred or more glass filaments, each over a mile long and two thousandths of an inch in diameter—filaments that have all the properties of the glass marble with the added one of flexibility.



Rigid sections of fibreglass, wrapped in scrim, or mutton cloth, passing out of a drying oven.

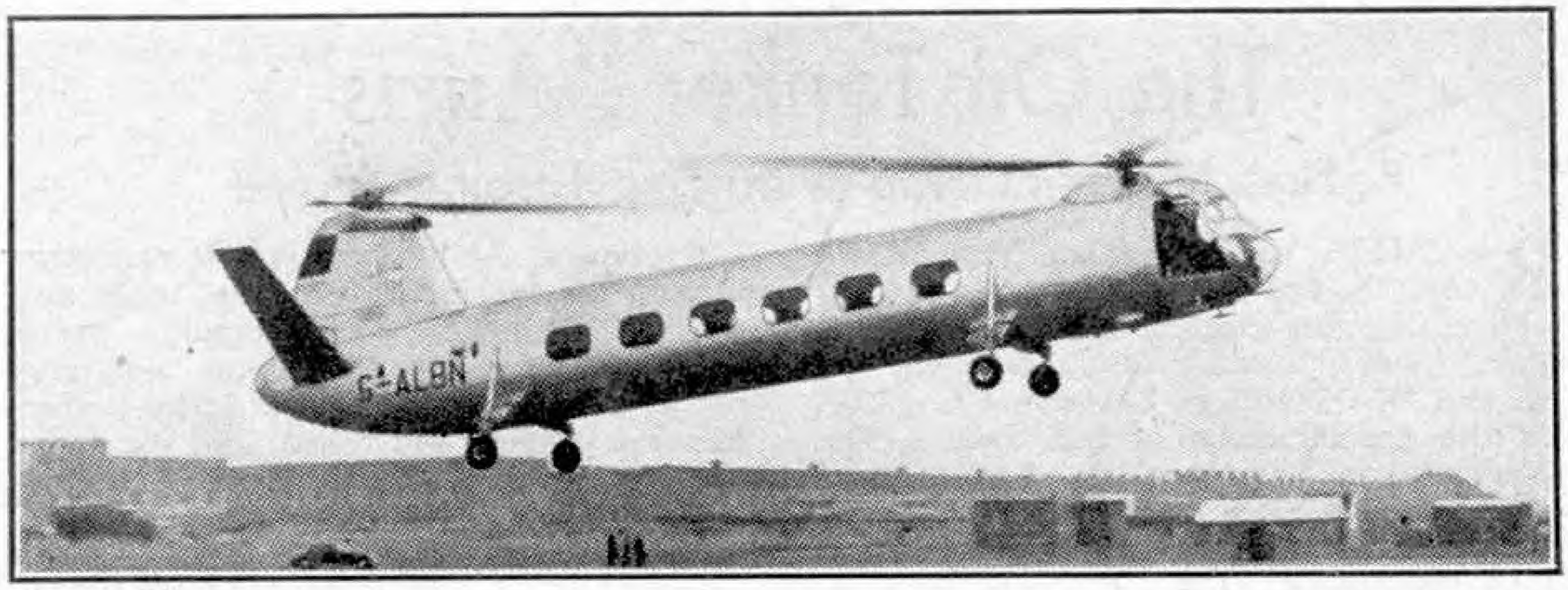
Continuous filament is preferred for electrical insulating purposes, because it is much finer than other varieties and of greater uniformity. It is woven into tapes that are widely used in all kinds of electrical insulation, and also into sleevings for short lengths of wire, such as lead wire and other conductors in motors, transformers, and so on. Both types of insulation have a much better heat-resisting and space-saving ratio than ordinary textile or asbestos coverings.

Finally, there is the staple filament process. Staple is produced from a quality of glass specially prepared to resist chemical action, and is used for making such a variety of things as rope, roofing material, chemical filtration cloth and lamp wicks. Recently it has been used with great success as a bitumenised covering for protecting the steel of buried oil pipe-lines from corrosion. Hundreds of miles of pipe-lines laid across the bare deserts of Iraq and Syria are protected in this way. It took 25 million square feet of staple Fibreglass to wrap one 700-mile 30-in. diameter pipe-line or, in other words, roughly enough staple fibre to cover most of the Lancashire glass-making town of St. Helens! Staple is, in fact, a valuable wrapping for any steel or iron pipes in corrosive soils.

In making staple filament the specially prepared glass is melted and allowed to flow through a number of very small holes in a special type of furnace bushing. As the glass streams leave the bushing they are subjected to steam blast and drawn downward towards a drum. The fibres are not wound on to the drum but, after merely contacting it, are pulled on a winder, the speed of which is adjusted so that the weight per yard of "sliver," or collected filaments, may be regulated. Then the sliver is guided from the winder on to cardboard tubes for collection.

When the required quantity of sliver has been wound on to a tube, the tube is released, weighed and checked, and passed on to a twisting frame. There the filaments are twisted together into a staple yarn ready for weaving into cloth for many industrial purposes, the most important of which were mentioned earlier in this article.

One of the more unusual applications of Fibreglass is for commutator cleaning brushes. These are of circular design and made from glass fibres lying parallel to each other. They are bound together with tape and finished off with enamel paint, and are made in diameter ranging from $\frac{1}{4}$ up to 1 in. and in a standard length of 6 ins. These brushes have made it unnecessary to take down a commutator for cleaning.



Helicopter Progress at Bristol

By John W. R. Taylor

AN important milestone in British helicopter development was passed on 3rd January last, when the new twin-engined Bristol 173, illustrated above, successfully completed its first flight over the great Brabazon runway at Filton. Absence of such an aircraft in the past has hampered the extension of B.E.A.'s inter-city helicopter passenger services, because the small four-seaters now in use are hopelessly uneconomic for such work and, in any case, the Ministry of Civil Aviation will not permit operation of single-engined helicopters into town centres because of the danger that would follow an engine failure.

So the Type 173 gives a first glimpse of the sort of aircraft that may be used on our first air bus services in a few years' time. The interior is very like that of any other bus. No steps are needed to get inside, and the 10–13 comfortable passenger seats are arranged in two rows down each side of a central gangway, with luggage space at the rear. Large cabin windows are also reminiscent of a bus, but there the similarity ends, for the 173's two 550 h.p. Alvis "Leonides" engines will enable it to carry its 13 passengers or 2,500 lb. of freight at 105 m.p.h. Top speed is about 142 m.p.h., and an important safety feature is that if one engine should fail, both rotors would be driven automatically by the remaining engine.

Naturally, it will be three or four years before we can expect to see a fleet of Bristol 173s on our internal air routes; but until then B.E.A. will be able to gain experience with the single-engined Bristol 171 four-seat helicopter, which uses the same engine and rotor. One Type 171 has, in fact, already been delivered to the Corporation for testing; while others are being flown experimentally by our armed Services. The Army, for example, have ordered four HC.11 "Sycamores," the military versions of the Type 171, for communications duties, and an HC.10 air ambulance.

One of the HC.11s has already been tested for air observation post work, at Boscombe Down. The

(*Continued on page 190*)

The upper picture shows the Bristol 173 twin-engined helicopter, and the lower one the "Sycamore" HC.10 ambulance version of the Type 171 single-engined helicopter. Photographs reproduced by courtesy of The Bristol Aeroplane Co. Ltd.

The Oil Tanker "*Auris*"

First Merchant Ship with Gas Turbine Engine

READERS will recognise immediately that the fine vessel shown at the head of the opposite page is a tanker. She is the "*Auris*," built and engined by R. and W. Hawthorn Leslie and Co. Ltd. to the specifications of her owners, The Anglo-Saxon Petroleum Co. Ltd. She is an unusual tanker, however, in that she is the first merchant ship to be powered by a gas turbine. Her remaining engines, three in number, are diesels of 1,105 b.h.p. Each engine is coupled to an alternator, supplying current to a main electric motor that drives the propeller.

The "*Auris*" was built with two purposes in mind. The first was to experiment with the burning of boiler fuels in one of its high speed engines—as was done in the tanker "*Auricula*" with slow-speed engines—and the second to allow for the installation of the gas turbine as part of the power plant. The two chief features in the operation of ship machinery are reliability and fuel economy. The latter can be calculated with reasonable accuracy, but the degree of reliability can be determined only by testing under service conditions.

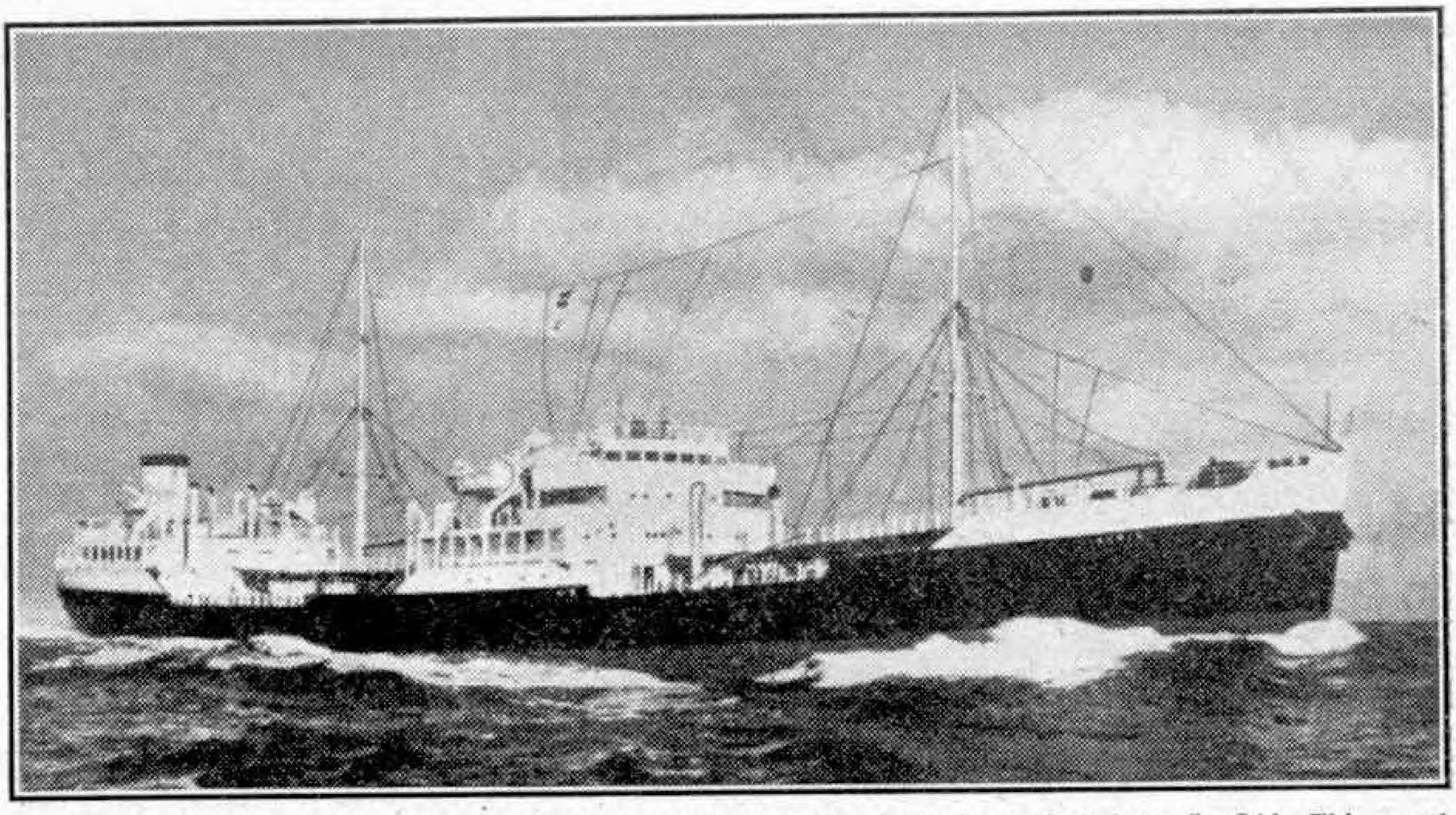
Mr. John Lamb, O.B.E., of The Anglo-Saxon Petroleum Co. Ltd., in the engine room of the "Auris" discussing the vessel's gas turbine with Chief Engineer A. N. V. Beedle, Mr. R. M. Duggan, Capt. F. T. Vine, Master of the tanker, and Second Engineer R. T. Breeds.

The "*Auris*" has provided the means of making this test with her gas turbine. After this had been installed she sailed from Hebburn-on-Tyne to Port Arthur, Texas, and afterwards visited Curacao, Avonmouth, Swansea, Hull, Rotterdam, Oslo and Southampton for the purpose of loading or discharging cargo. On these voyages she covered 13,211 nautical miles, and the machinery was operated for 1,391 hours. At no time was it necessary to stop the turbine at sea, or to make any repairs, although exceptionally heavy weather was encountered on six days between the Tyne and Port Arthur, when the ship pitched and rolled, and sea spray constantly swept the air intake of the turbine engine.

The success achieved in these voyages appears to show that the installation of the gas turbine in the "*Auris*" has opened a new era in ship propulsion. There is much to be done before the engine can be considered satisfactory in every way, but those who planned the experiment have no doubt that the day is not far off when the gas turbine will rival the steam turbine and the diesel engine in reliability and fuel economy, and will be cheaper than either to keep running and in good order.

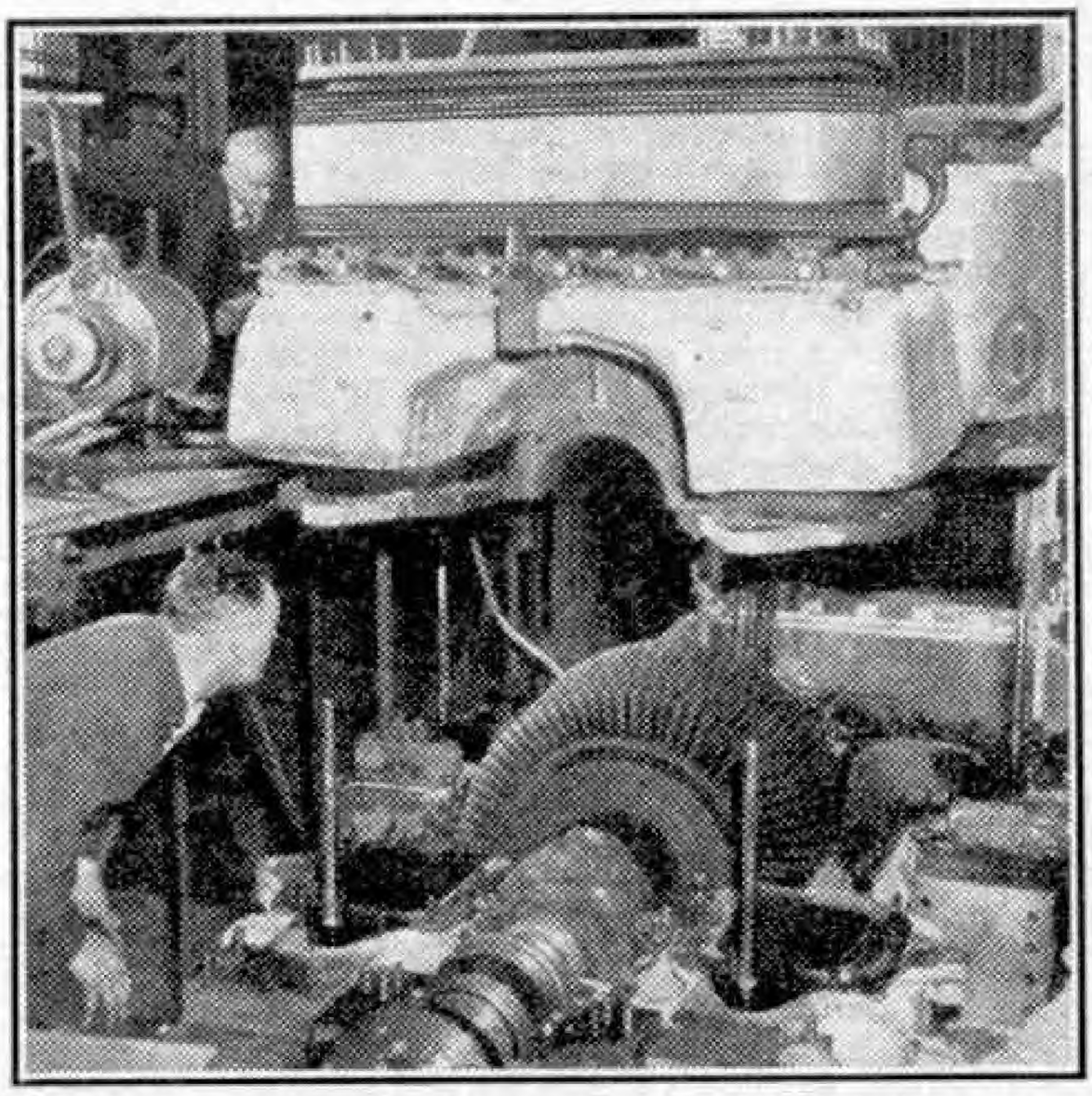
How successful this novel engine is was clearly shown in a demonstration trip from Southampton late in January last. A representative of the "*M.M.*" who was on board remarked on the lack of vibration, and learned from Captain F. T. Vine, the master of the vessel, that he was very highly satisfied with the performance of the vessel and of its turbine engine. Indeed it had already been decided that in the next Atlantic crossing of the "*Auris*" the gas turbine alone should be used, a plan that promises highly interesting results.

The principle of the gas turbine installed is very simple. Air is compressed and enters an exchanger, where it is heated by passage through tubes over which



Starboard view of the experimental tanker d.e.s. "Auris," of The Anglo-Saxon Petroleum Co. Ltd. This vessel of 12,250 tons deadweight was built by R. and W. Hawthorn Leslie and Co. Ltd. at Hebburn-on-Tyne.

flow exhaust gases from the engine. The heated air passes into combustion chambers into which the fuel oil is sprayed and where this is burned. The high temperature gases produced pass through two turbines in succession, one at high pressure and the other at low pressure, before being exhausted, yielding up some of their remaining heat to the incoming air, as already explained.

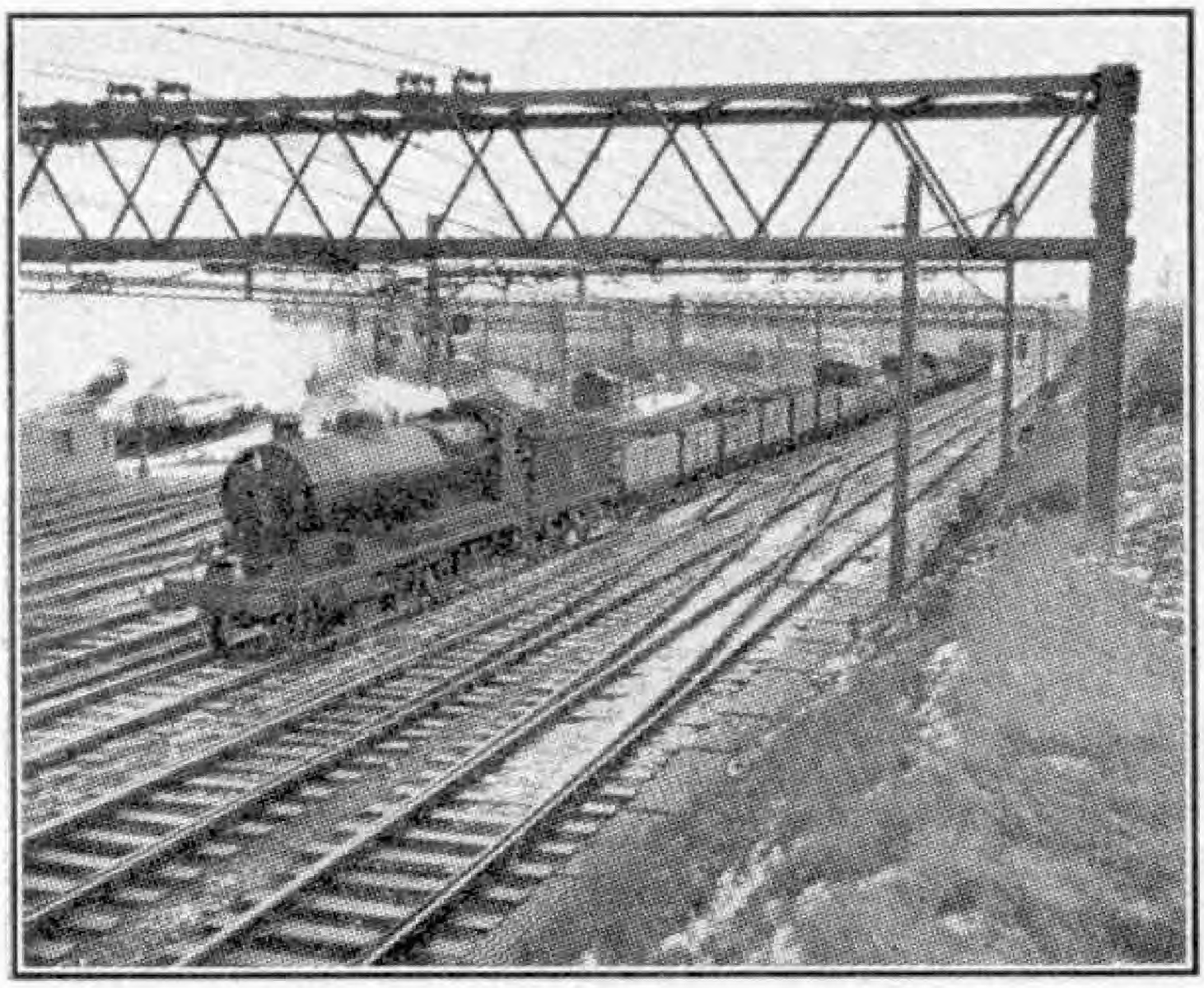


The low pressure turbine of the gas turbine engine of the "Auris," with the top half casing lifted to reveal the blades. The illustrations to this article are reproduced by courtesy of the Shell Petroleum Company.

The lower illustration on this page shows the inside of the low pressure turbine, and the blades of this, over which the hot gases pass, are clearly seen. This low pressure turbine is connected directly to the alternator that produces current for the motor that turns the propellers of the vessel. The high pressure turbine operates the compressor, which drives the incoming air under pressure through the heat exchanger into the combustion chamber.

The engine is started by means of a 50 h.p. electric motor, which is engaged through gearing to the shaft of the compressor. This and the high pressure turbine connected with it are run up to a speed of about 1,200 r.p.m., which is a fifth of the full load speed. Torch igniters that throw pilot flames into the combustion chambers are then ignited electrically, and these light the main burners. The unit then begins to turn faster and faster, with diminishing help from the starting motor, which is automatically disconnected when it is no longer required.

There is a bye-pass valve through which the gases may pass direct from the high pressure turbine to the heat exchanger. By keeping this open the pressure behind the high pressure turbine is reduced, making starting easier and quicker. The valve is also a safety device, for it would open if either turbine shaft turned too fast, as would happen if (*Continued on page 190*)



The elaborate overhead network of the electric installation at Barnsley Junction, Penistone, makes a canopy above a steam-hauled freight. This and the upper illustration on the next page are from B.R. Official Photographs.

Railway Notes

By R. A. H. Weight

New Locomotives in Scotland

The early weeks of the New Year brought news of the completion and placing in service of the first standard light class "6" "Clan" 4–6–2s which are being built at Crewe. The driving wheel diameter is 6 ft. 2 in. and the boiler pressure 225 lb. per sq. in., the boiler being smaller than on the "Britannia" type. The starting tractive effort is 27,520 lb.

Nos. 72000–3 had up to the time of writing been allocated to Polmadie shed, 66A. No. 72001 *"Clan Cameron"* made trial runs on Euston to Birmingham and Wolverhampton expresses in January; about the same time No. 72002 *"Clan Campbell"* was noted on local trains in the Stafford-Birmingham area. Subsequently all three had settled down to regular work on Liverpool and Manchester-Scottish expresses, while No. 72003 *"Clan Fraser"* was seen outside Crewe Works. Others have since followed, and have been "run-in" from Crewe before proceeding North. The order is for 10 engines named after representative Scottish clans.

Standard 2–6–4Ts continue to appear new from Brighton Works and receive trial periods of running before proceeding on their long journeys to home sheds. Nos. 80022 and 80026–7 are allocated to 66A, Polmadie; 80024–5 to 67A, Corkerhill, Glasgow; and 80028–9, 61A, Kittybrewster. I saw No. 80024 on a parcels train at St. Leonards, Sussex, on 18th December, but by 4th January this locomotive was reported in Glasgow, having been seen approaching Crewe as a light engine intermediately.

New class "4" L.M.R. type 2–6–0s built at Horwich include Nos. 43133–6, at 65A, Eastfield.

National News

British Railways are to build 180 hopper wagons of a special type to carry 25-ton loads of phosphate of soda and soda ash in bulk from Cheshire to factories in the north-west and eastern counties of England. Some 125,000 tons of this traffic is moved annually in connection with the manufacture of synthetic soaps and cleaning materials. In a recent four-weekly period the freight carryings on British Railways were the highest recorded since 1945. During one week-end 46,356 wagons of coal were moved from pits or opencast sites, the highest figure ever recorded.

Hanging space is being provided in brake vans or luggage compartments of the new standard passenger coaches for the secure accommodation of from two to six passengers' bicycles. Metal hooks, covered with rubber or plastic, attached to the roof will take the front wheel, while the rear portion of the machines are secured in racks.

London Midland Region

The "Fell" 2,000 h.p. diesel-mechanical 4–8–4 main line locomotive, No. 10100, commenced regular running on 21st January last when it was announced that it would haul passenger and parcels trains over the steeply graded route between Derby and Manchester (Central), making two round trips each day from Monday to Friday.

An historic stationary winding engine that had been hauling trucks of coal up a 1 in 17 gradient at Swannington, Leicestershire, for more than 100 years has ended its long service and gone to join the fine collection of relics in the Railway Museum at York. This single-cylinder engine with "gab" motion or gear, operated by hand, was built by order of George Stephenson for one of the earliest railways in the Midlands, the Leicester and Swannington. It was equipped with one of the earliest examples of the slide valve, such as is still in use in improved form on a considerable number of locomotives.

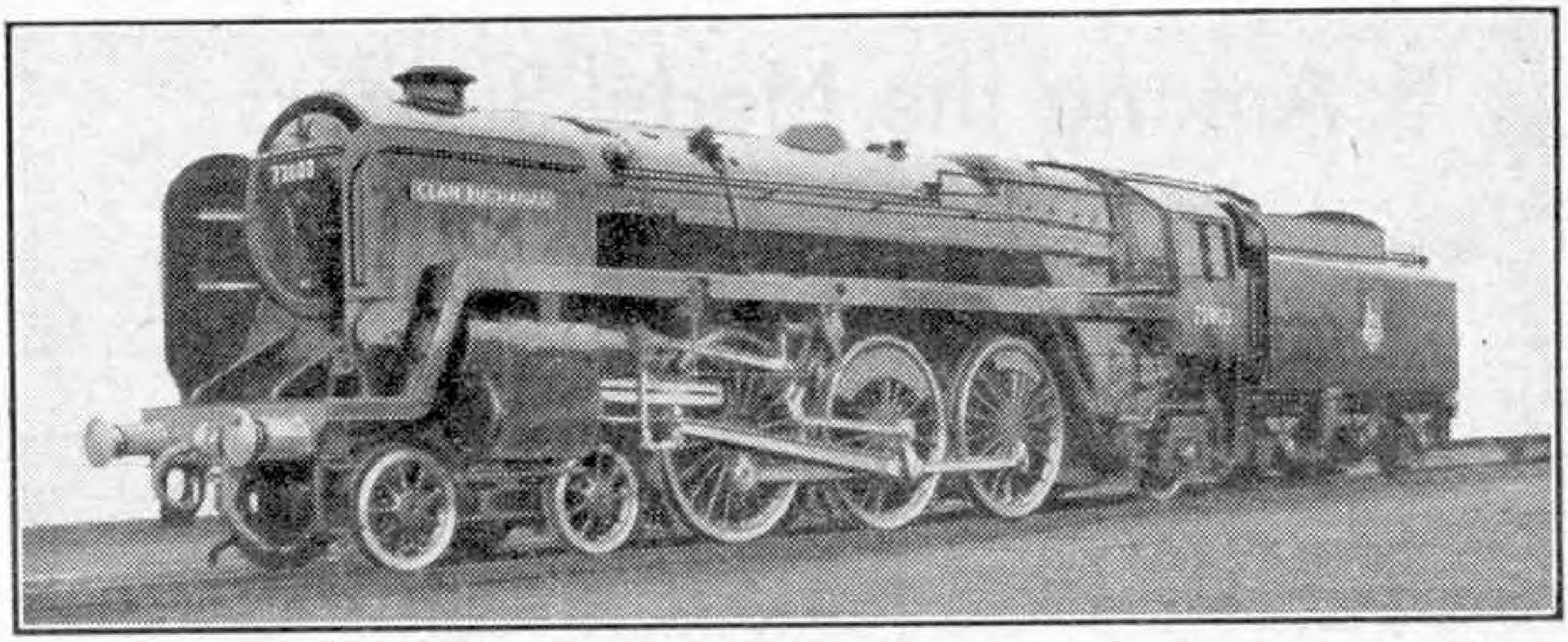
The withdrawal of tank engine No. 47931, only fairly recently painted and decorated with B.R. emblem, renders the L.M.R. class "7" 0–8–4T extinct. Built to L.N.W.R. design just after grouping of the railways in 1923, these large and rather impressive tanks had small driving wheels for working heavy loads over steep gradients in South Wales, cylinders with the liberal diameter of 20½ in., Joy's valve gear and piston valves. Latterly they were usually seen in the Derbyshire or West Lancashire districts. The six ex-G.C.R. or L.N.E.R. 3-cyl. freight "humping" tanks are the only 0–8–4s left in this country now.

Another class now extinct is the former Lancashire and Yorkshire 0–8–0 tender type, No. 52857 of the final series of 155 large-boilered engines having been withdrawn.

The order for class "5" standard 4–6–0s has been completed, as No. 73029 has gone from Derby Works to join others of the series at Blackpool shed, 28A. Additional class "4" standard 4–6–0s built at Swindon are Nos. 75016–7 allocated to Southport, 27C. Several more L.M.S. 0–8–0s have been withdrawn, as have two of the veteran Webb 0–6–0 coal engines, which are gradually disappearing.

Isle of Man Railways To-day

Since the conclusion of another busy summer season in 1951, when many thousands of visitors were successfully carried, I have received an interesting report from a reader upon his travels and observations on the Isle of Man Railway. This line is laid to a



"Clan Buchanan," the first of the B.R. standard 4-6-2s for Scottish Region duties. These engines are similar to the now well-known "Britannias," but they have smaller boilers and are lighter in weight.

gauge of 3 ft. and still relies on the elderly but efficient Beyer-Peacock 2–4–0 tank locomotives, with brass domes and typically Victorian appearance. Their light green paint of pre-war days has given place to brown, lined black and yellow. They have outside cylinders 11 in. in diameter with 18 in. stroke and 3 ft. 9 in. driving wheels, and are named. The small but distinctive coaches were being painted a darkish red with cream panels.

The services compared favourably as regards fares and speed with the competing buses and fine scenic views are obtained from the trains. The journey from Douglas to Ramsey by a somewhat circuitous route extends over 25 miles, some of the trains carrying through portions to Peel. Another service operates between Douglas and Port Erin. There is also the Manx Electric Railway, which is popular, and the electric mountain tramway up Snaefell, the highest peak in the delectable island.

Western Tidings

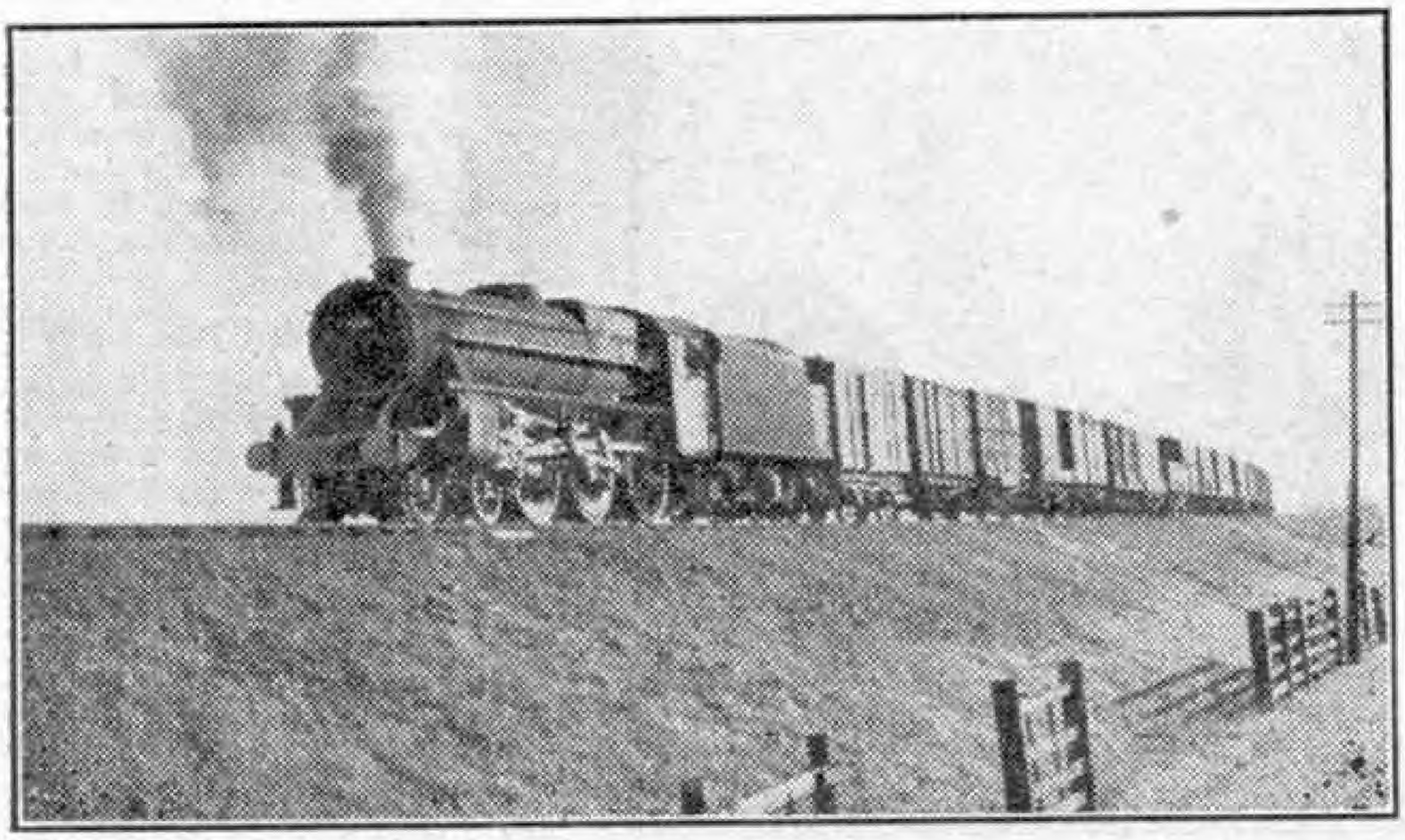
No. 18100, the first British-built gas turbine locomotive, illustrated last month, has been delivered by the makers, The Metropolitan-Vickers Electrical Co. Ltd., of Manchester. It was hauled to Swindon and afterwards brought to Paddington for inspection, and then engaged in running trials.

The new engine is intended primarily for express work on the London-Plymouth route, being suitable for use on any of the British main lines, and will be compared in performance with the similar experimental Swiss-built locomotive, No. 18000. The British one is more powerful, with a maximum tractive effort of 60,000 lb., and it is capable of a maximum speed of 90 m.p.h. Each of the six driving axles is geared to an electric motor, driven by current from generators coupled to the gas turbine.

New 0–6–0 pannier tanks built by contract and lately placed in service include Nos. 9459–65 and 8475. The 2-cyl. 4–6–0s Nos. 2927 "*Saint Patrick*" and 2949 "*Stanford Court*," of Swindon shed, have been condemned for scrapping. In addition, No. 2940 "*Dorney Court*" of the same class, from Cardiff, and No. 4043 "*Prince Henry*," a Bristol 4-cylinder, have been withdrawn.

Five "County" 4–6–0s have been tranferred to Shrewsbury shed, 84G; these are Nos. 1004 "*County of Somerset*"; 1013 "*County of Dorset*"; 1017 "*County of Hereford*"; 1018 "*County of Leicester*"; and 1019 "*County of Merioneth.*" The intention appears to be to use "Britannia" class 4–6–2s a good deal along the difficult Plymouth-Penzance section. One of their recent duties has included the haulage of the "*Cornish Riviera Express*" over that stage in each direction.

Special prizes for the best-kept station gardens last year were awarded to Shiplake, Yatton, Langport West, Totnes, Rhymey Bridge, Resolven, Moreton-in-Marsh, Stratford-upon-Avon, Ludlow and Llynclys. In all 227 prizes were awarded and many lovely displays were inspected.



Climbing the grade with a fitted freight is L.M.R. No. 44833, one of the familiar Stanier class 5 4-6-0s. Photograph by Alan Lawson, Liverpool 15.

Eastern and North Eastern Locomotive Notes

New engines have lately been allocated as follows: "B1" 4–6–0 Nos. 61389–92, 35A, Peterborough and 61393–4 36A, Doncaster; class "4" L.M.S. type 2–6–0s, Nos. 43130–1, 53A, Hull, Dairycoates, and 43152–6 32G, Melton Constable. "EM1" electric locomotives for the Sheffield-Manchester line have been completed up to No. 26037 at least.

Several streamlined "Pacifics" are now painted dark green after overhaul at Doncaster, including "*Silver Link*," "*Quicksilver*" and "*Silver Fox*," of the famous original quartette turned out in silver-grey finish in 1935–6 for duty on the "*Silver Jubilee*" high-speed express between London - Newcastle.

Among the Model-Builders

By "Spanner"

REAR AXLE UNIT FOR SMALL CARS

Ronnie Davies, Leeds, spends most of his model-building time in the construction of small model vehicles, and he has become quite an expert on this subject. He has to build his models from a small Outfit plus some extra parts, mainly gears, but by careful planning and scheming he manages to produce really attractive working models that compare most favourably with many models built by boys having a much wider range of parts at their disposal. For example, he designed recently the neat rear axle unit shown in Fig. 1, and he thinks it will be of interest to other builders of small cars.

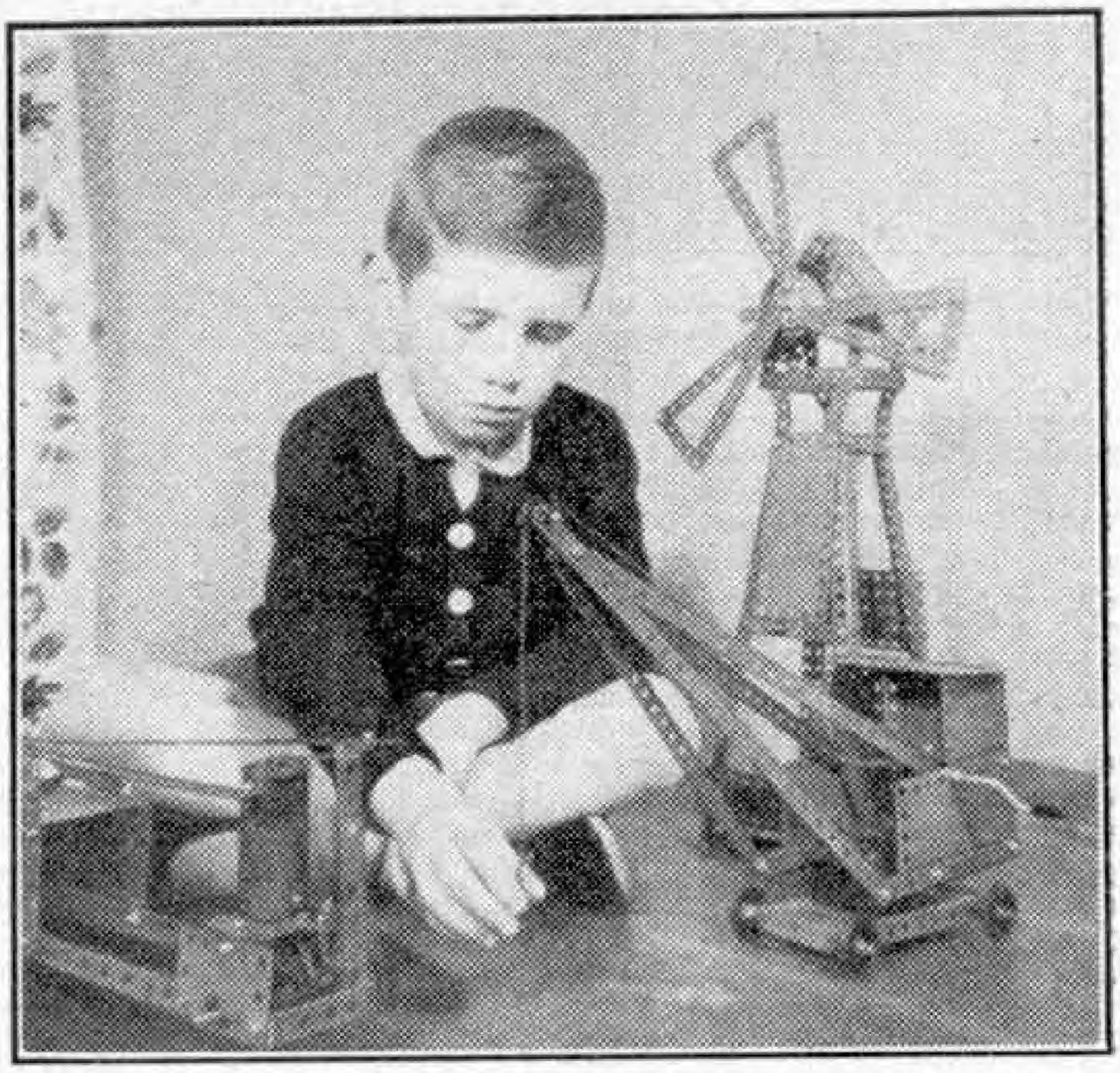
The rear axle casing is made from two $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strips on each side, bolted to a Bush Wheel 1 and a Wheel Disc 2. The leaf springs consist of $4\frac{1}{2}''$, $3\frac{1}{2}''$, $2\frac{1}{2}''$ and $1\frac{1}{2}''$ Strips, and they are fixed to Double Bent Strips 3 passed over the axle casing and attached to the Double Angle Strips.

The bolts that fix the Double Angle Strips to the Bush Wheel also join the halves of the casing to two Double Brackets that space the Bush Wheels apart. A Fishplate 4 is bolted to the leading Double Bracket, and the rear Bracket supports a $\frac{1}{2}''$ Reversed Angle Bracket 5.

The rear axle is passed through the casing, and a $\frac{1}{2}''$ Pinion is fixed to it centrally between the Bush Wheels. The driving gear is a Worm 6 on a $1\frac{1}{2}''$ Rod mounted in Fishplate 4 and Reversed Angle Bracket 5.

A DINKY TOYS SERVICE STATION

Many Meccano model-builders are also enthusiastic Dinky Toys collectors, and from photographs I receive from time to time it is evident that scale vehicles, carefully positioned on models such as bridges, can greatly increase the realistic effect of a well-built model. I feel sure therefore that readers who combine the two hobbies will be interested in the attractive garage and service station seen in Fig. 2. This was built by Mr. R. L. Woodward, Letchworth, for his son, who is a very keen collector of Dinky Toys and already has a very extensive collection. Some of his models are seen in the garage entrance, and I think readers will agree that the result is very effective.



Meccano days are happy days! So thinks six-year-old Christopher Morgan, here seen surrounded by examples of his handiwork at his home at Bristol.

The garage is well-proportioned and constructed, and particularly interesting features are the display windows and showrooms, inside which vehicles for sale are clearly visible to the public.

Mr. Woodward's son certainly is very fortunate to have such an attractive centre-piece for his collection. Very good effects can be obtained with even a simple garage, however, and I suggest that other collectors would find it well worth while to experiment with schemes of this kind.

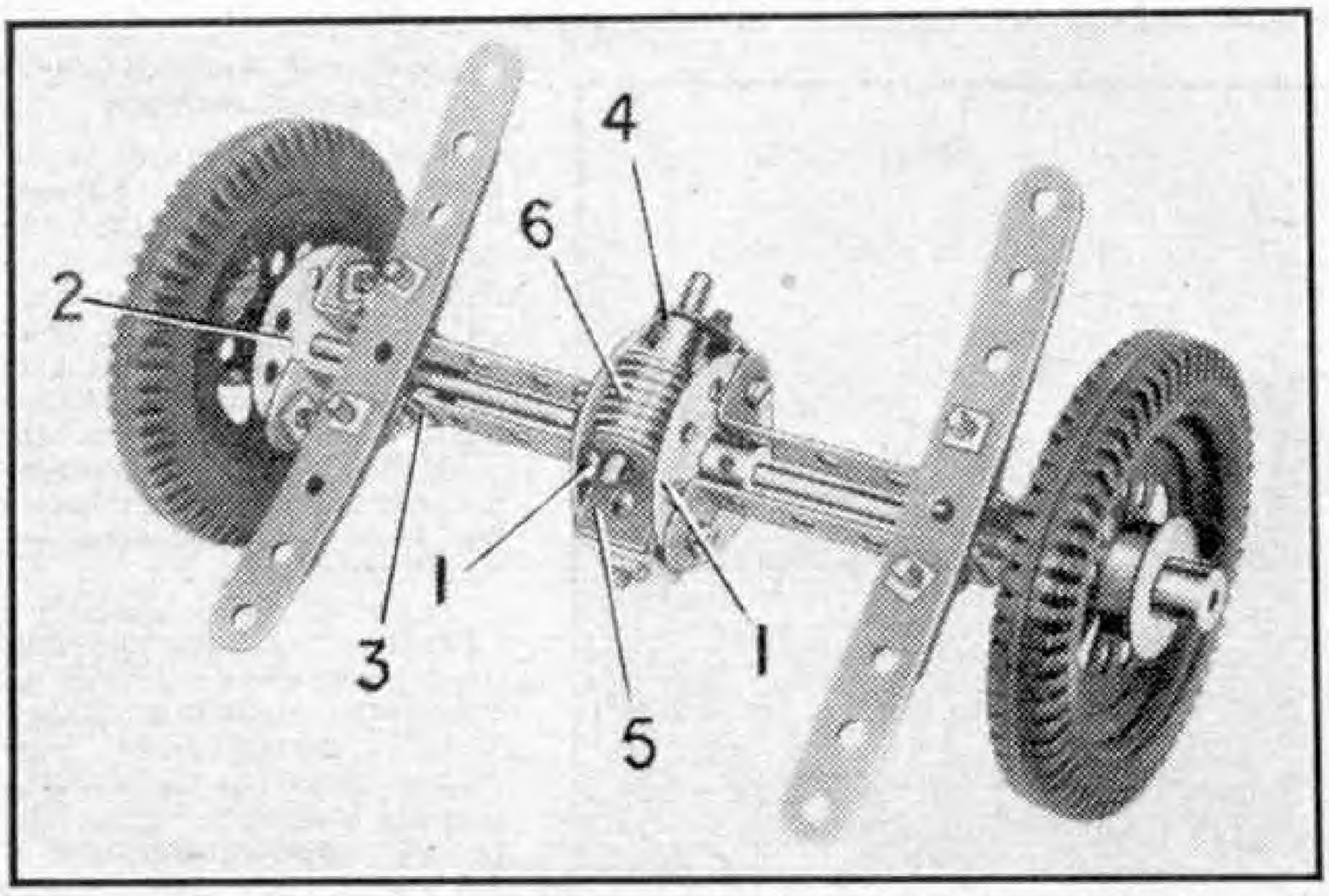


Fig. 1. A direct drive rear axle unit specially intended for use in simple model cars. It was designed by R. Davies, Leeds.

EPICYCLIC CLUTCH UNIT

Fig. 3 shows an interesting clutch mechanism that depends for its operation on epicyclic gearing. The input and output shafts are mounted in line with each other, but when the clutch is engaged there is a 2 : 1 reduction between the shafts. This feature will be found very useful in models where space is limited and some reduction in speed between the power unit and the model driving shaft is required.

The mechanism is housed between two Boiler Ends, which

in the final assembly are connected together by 1½" Strips fitted on stud bolts. The bolts are first passed through the Boiler Ends and held tightly by nuts, and then further nuts are used to fix the 1½" Strips in place. A Double Bent Strip is bolted to each Boiler End to provide bearings for the clutch shafts.

A 1½" Contrate 2 is fixed to the input shaft 1, and the output shaft is fitted with a similar Contrate 3. Contrate 3 is free to turn on its shaft however, and is held in place by a Collar 4. The Collar is spaced from the Contrate by Washers, so that the ½" Pinions 5 mesh accurately with the Contrate teeth. The Pinions 5 are freely mounted on ¾" Bolts screwed into Collar 4.

The clutch withdrawal lever is a 1½" Strip clamped between nuts on a Screwed Rod 6. This Rod is mounted in a 1½" × ½" Double Angle Strip bolted to the Boiler End, and it is fitted with two Fishplates also clamped tightly between nuts. A ⅜" Bolt is passed through the slotted hole of each Fishplate into a Collar 7. The Collars are screwed on to Pivot Bolts passed through the Boiler End, and each Pivot Bolt is fitted with a Compression Spring between the bolt head and the inside of the Boiler End.

The Compression Springs normally press the Pivot Bolt heads against the Contrate 3 and prevent it from turning. The Pinions 5 are then forced to climb round the teeth of the Contrate and thus rotate the output shaft. When the withdrawal lever is operated the Contrate 3 is set free and is then driven by the Pinions in the opposite direction to Contrate 2, the output shaft remaining stationary.

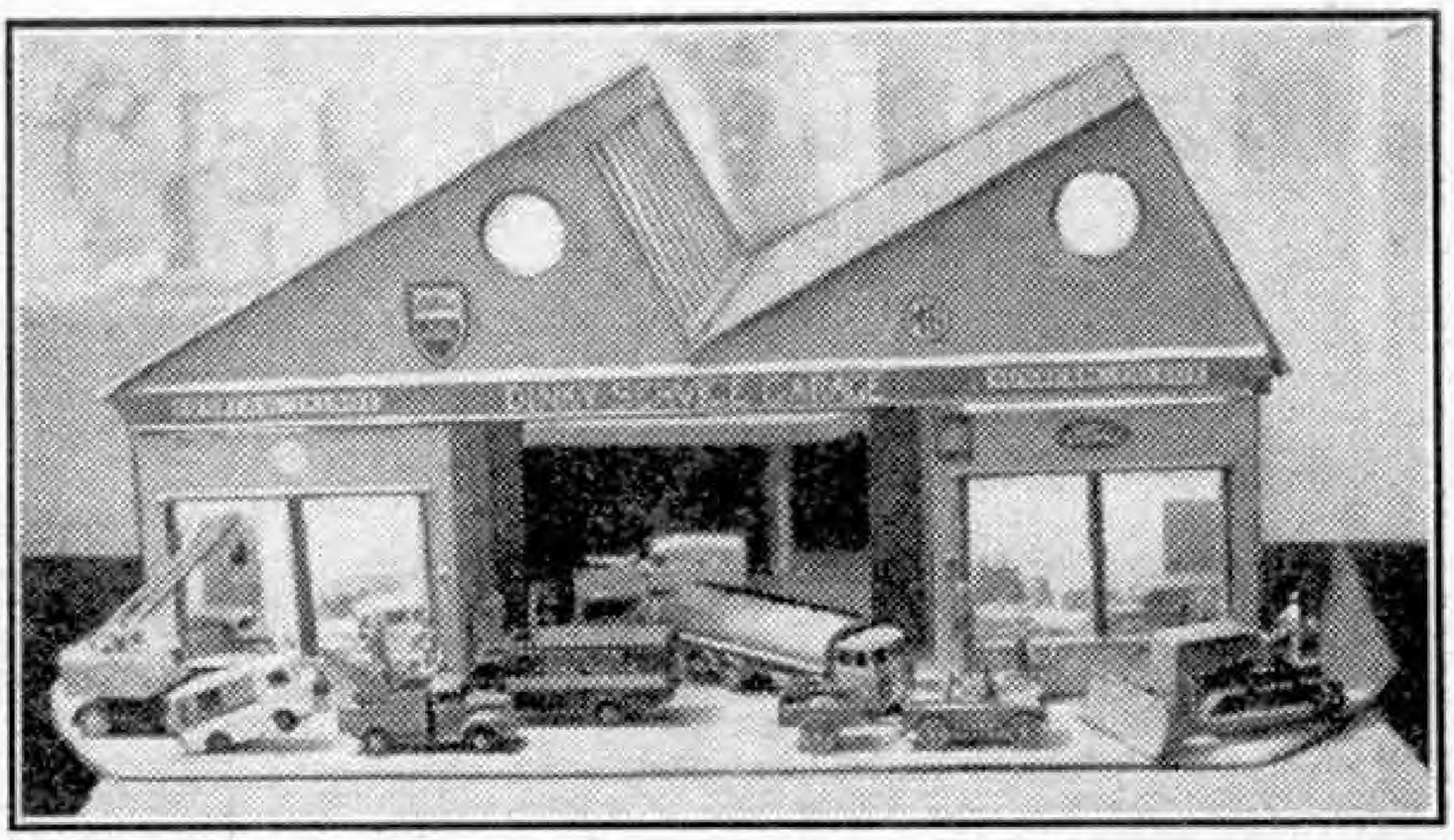


Fig. 2. This effective model garage was built by Mr. R. L. Woodward, Letchworth, for use with his son's collection of Dinky Toys.

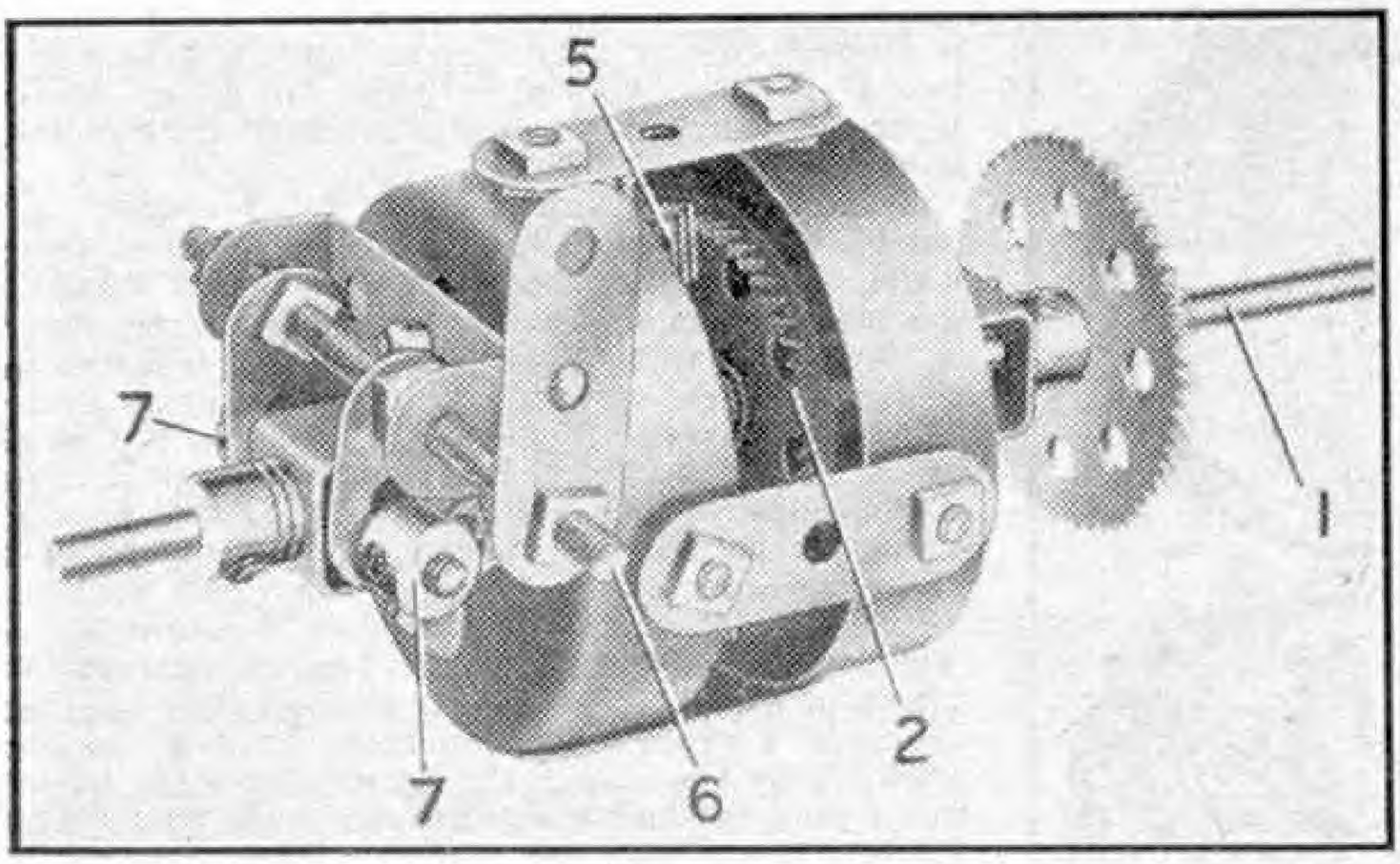


Fig. 3. A novel epicyclic clutch unit.

REMOTE CONTROL FOR MODELS

Among many suggestions I have received recently is one from N. Owens, Blackburn, who suggests that special lengths of coil spring should be introduced for use in Bowden type control mechanisms, so that models can be operated from a distance. It seems, however, that Owens has overlooked the fact that the Spring Cord already included in the Meccano system is excellent for the purpose he has in mind. A piece of strong thin wire threaded through a length of Spring Cord makes quite a serviceable flexible control, and is suitable for operating brakes and gear change devices.

The ends of the Spring Cord should be suitably clamped between Strips or in a Collar. The wire is then passed through the centre of the Cord, and one end of it is attached to the operating lever and the other to the brake shoe or gear change lever.

LUBRICATING MODELS

I would like to remind model-builders of the necessity for lubricating their models if they wish to obtain smooth and quiet running. A thin light oil should be used and a few drops should be applied to each bearing and all moving parts. The bearings of Motors also should be oiled occasionally but very sparingly.

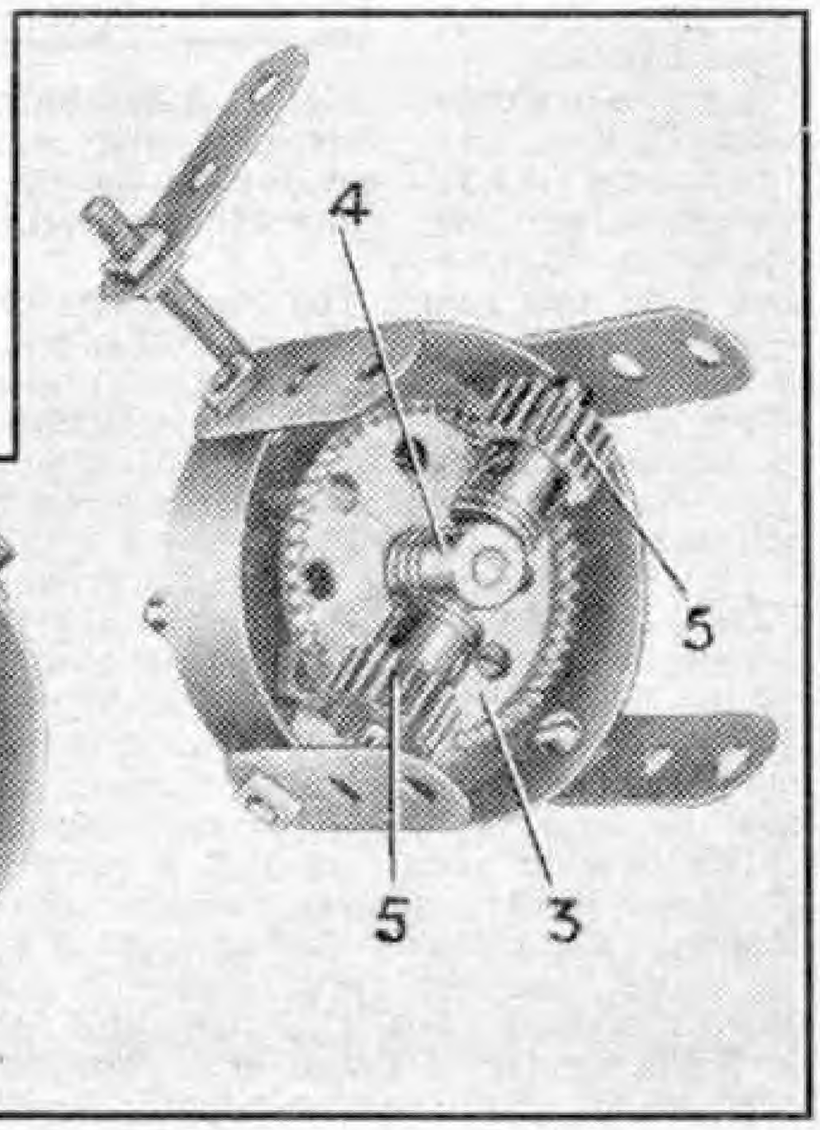


Fig. 4. The clutch unit dismantled to show the internal details.

Model-Building Made Easy

By "Spanner"

Bearings for Working Models

IN all working models, even those of the most simple kinds, some parts have to move in relation to others, and it is very important that these actions shall be carried out quite smoothly and freely. This is particularly important when the model is driven by either a Clockwork or an Electric Motor; otherwise much of the power of the Motor will be taken up in overcoming friction between the moving parts.

For these reasons it is very necessary to provide all moving parts with suitable bearings in which to turn. These bearings can take many forms, depending on the type of moving part to be supported, and it is quite easy to assemble a great variety from the parts in the Meccano system.

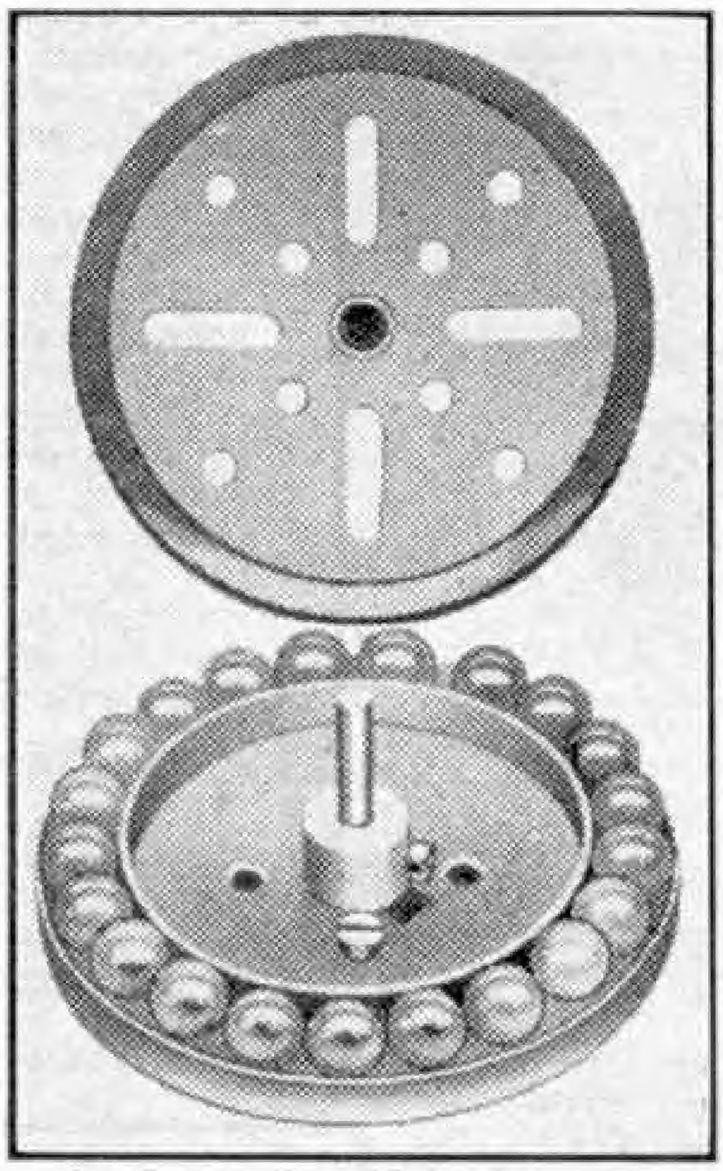


Fig. 1. A ball bearing that is easy to assemble and which is useful for supporting the jib of a crane or any other swivelling structure.

A particularly good example of a model that depends very greatly on suitable bearings for its satisfactory working is a crane. Cranes probably are the most popular of all subjects with model-builders, as it is possible to construct really good models of this kind from quite small Outfits. Most of them consist of a base or tower that supports a swivelling jib and driver's cab, which is usually called the superstructure.

Two suitable bearings for carrying this superstructure are shown in Figs. 1 and 3 on this page. The lower part of the bearing seen in Fig. 1 is a 3" Pulley. This has a short Rod in its bore and is fixed to the stationary base or tower of the model. The bolts holding the Pulley in position fix also a Wheel Flange, and 21 Balls (part No. 117) are placed between the Wheel Flange and the rim of the Pulley.

The upper part of the bearing is a further 3" Pulley, and it is passed over the short Rod so that it rests on the Balls. The upper Pulley is attached to the underside of the jib or other part that is required to swivel, and a Collar fixed on the upper end of the Rod that passes through the bearing is used to hold the complete unit together.

The bearing shown in Fig. 3 makes use of four ½" loose Pulleys placed between the rims of 3" Pulleys. The lower 3" Pulley is fixed to the base of the model, and the upper Pulley is attached to the moving section. The ½" Pulleys are mounted freely on Rods fixed in a Coupling 2. The 1½" Rods 1 are fixed in the ends of the Coupling, and a 3½" Rod 3

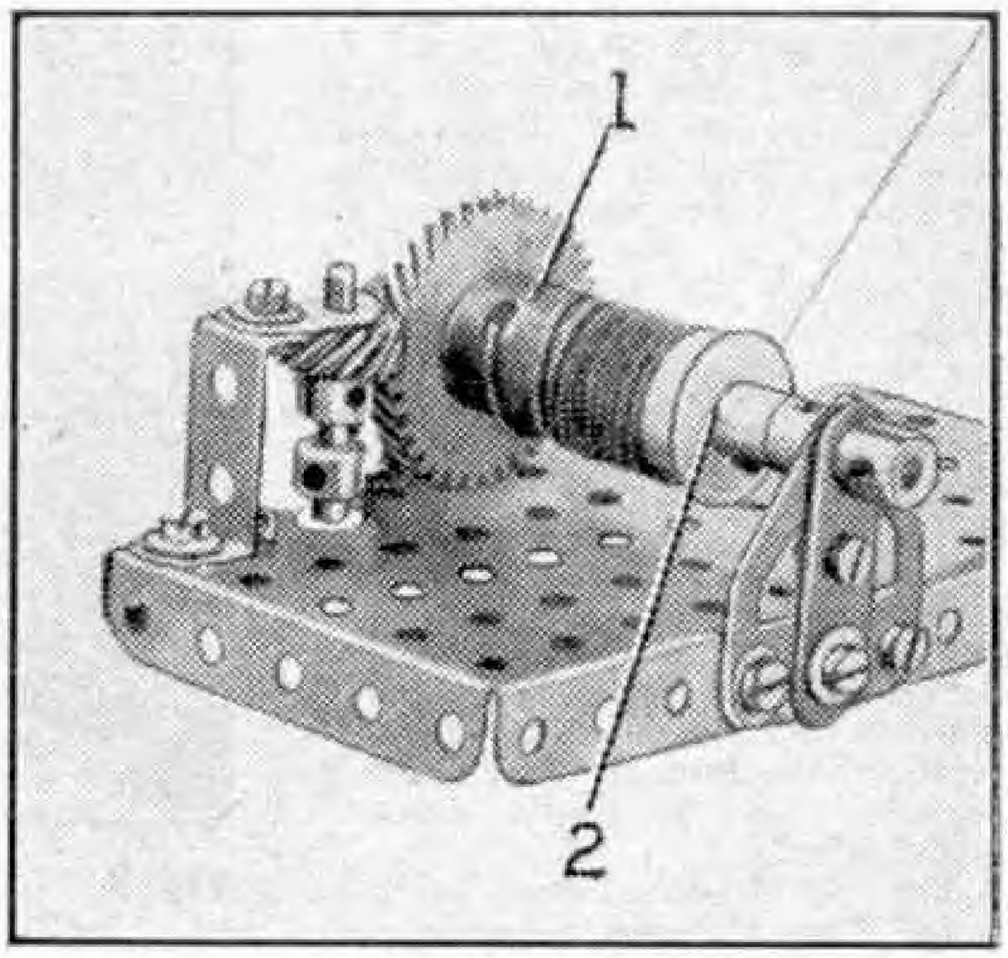


Fig. 2. A good example of a bearing for a Rod. It is reinforced or strengthened as explained on this page.

is passed through the centre hole and held by two ¾" Bolts 4 screwed into the Coupling. These Bolts pass through the bosses of the 3" Pulleys and hold the unit together.

Rotating Rods can be supported merely by passing them through the holes in Strips or Plates; while this is satisfactory for very small models, it is advisable in models of a heavier kind, especially if the Rod has to revolve rapidly or transmit a powerful drive, to provide bearings of a more substantial type. The bearing surface provided by a Strip or Plate is really very small and therefore is apt to wear fairly quickly. It can easily be increased, however, by bolting several Strips together or by fixing another part such as a Crank to it. This forms what is known as a "reinforced" bearing, and a typical example is shown in Fig. 2. This bearing supports the winding drum of a crane, and the large bearing surface provided by the boss of the Crank allows the model to be used to raise much heavier loads than those for which an ordinary Strip or Plate bearing is suitable.

In this mechanism the winding drum is driven by Helical Gears. When these Gears or a Worm is used the driven Rod tends to be forced endways to one side or the other depending on the direction of the drive, and it is necessary to strengthen the bearings to withstand this thrust.

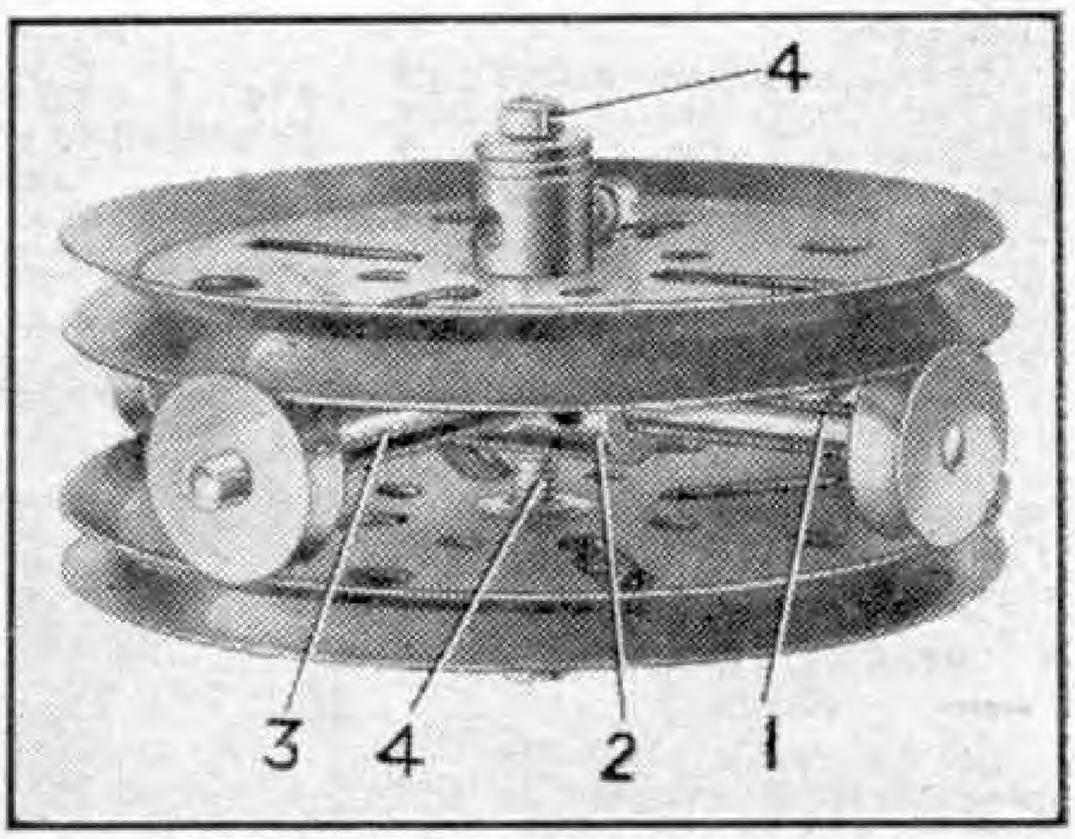


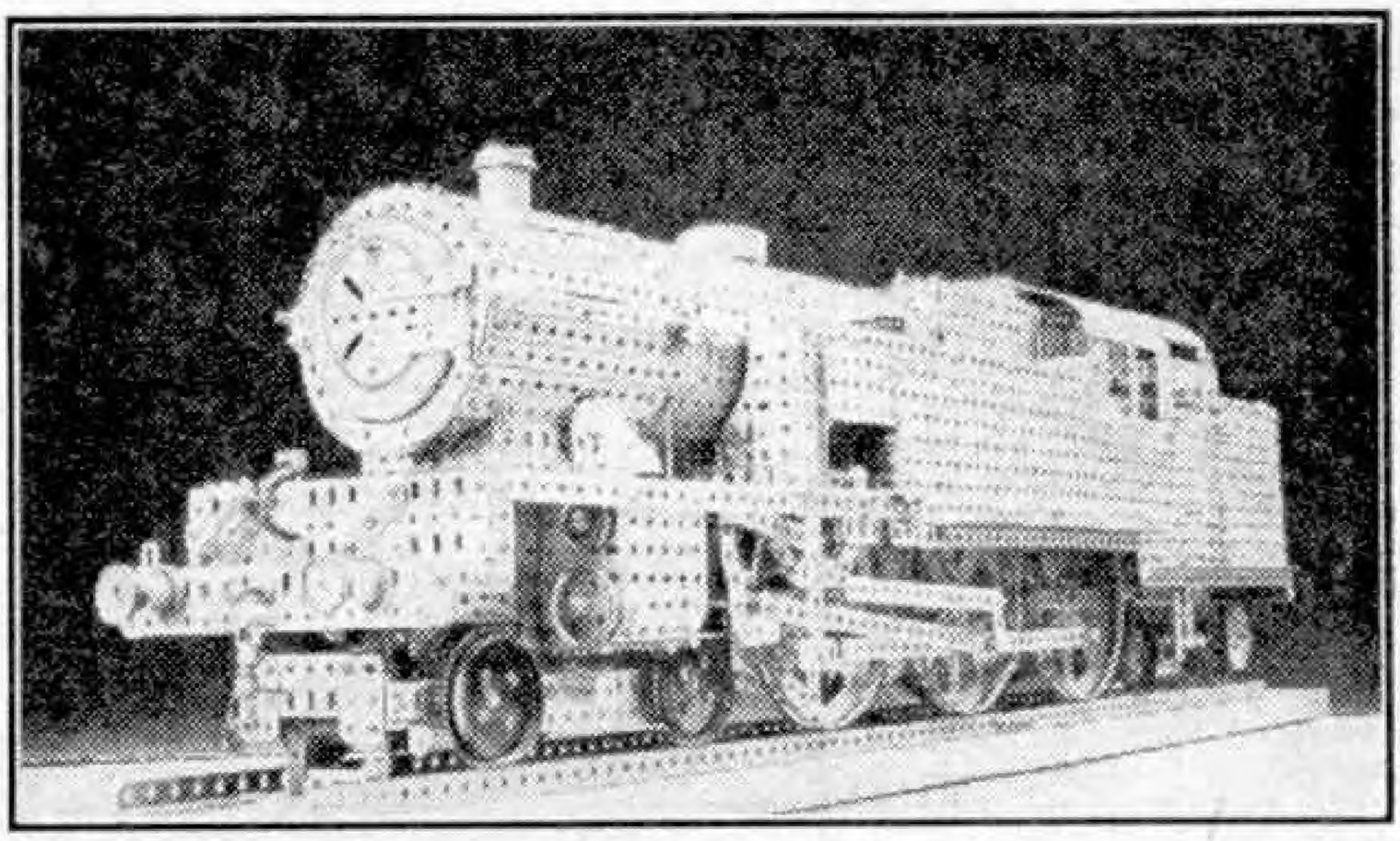
Fig. 3. A simple roller bearing that can be used as an alternative to the ball bearing seen in Fig. 1.

Prizes for Model-Builders

No. 2 and No. 7 Outfits Competition

IN the March issue of the Magazine we announced the second of our series of "Outfit" Competitions, in which we offered prizes for models of any kind built from either a No. 2 or a No. 7 Meccano Outfit. As there may be some model-builders who did not see the first announcement and who would like to take part in the Contest we are repeating its main details.

All Meccano model-builders are eligible as competitors, and entries will be divided into four groups. Section A, for models from Home readers built from Outfit No. 2; Section B, for models from Home readers built from Outfit No. 7; Section C, for models built by Overseas readers from Outfit No. 2; and Section D, for models built from Outfit No. 7 by Overseas readers. *Each Section is open to readers of all ages.*



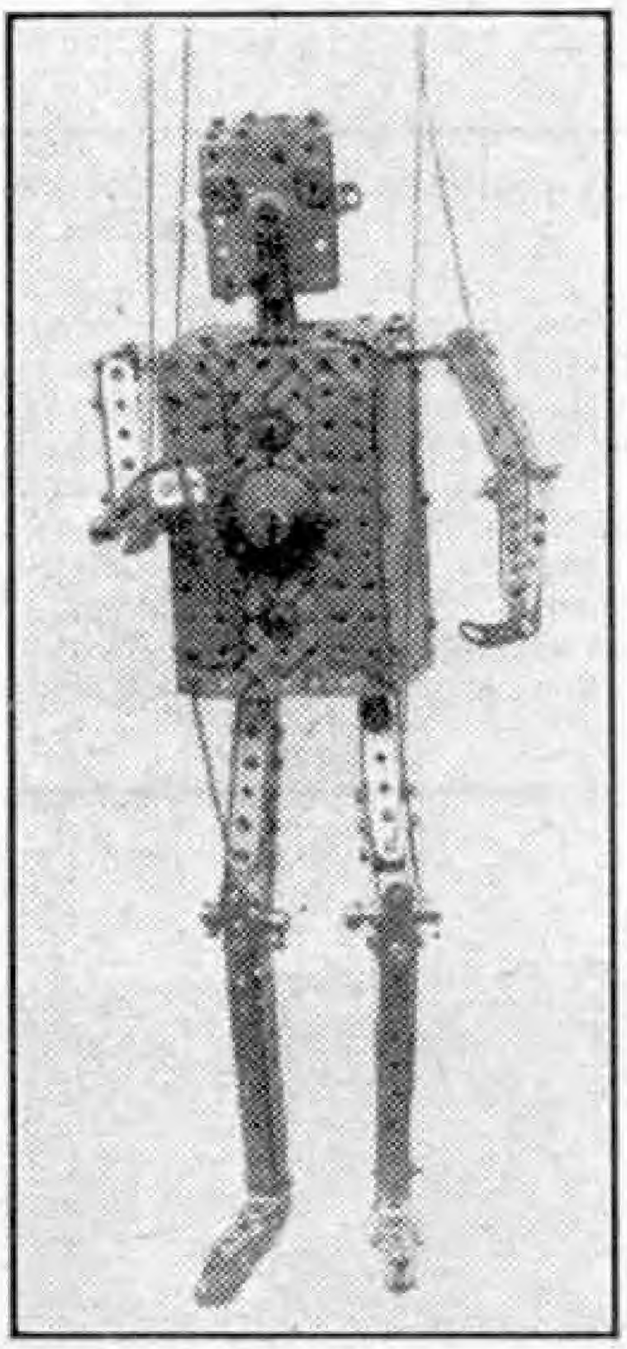
This attractive model of a four-cylinder "Baltic" Tank Locomotive is the work of S. Croft Gray, Edinburgh.

Competitors may submit both a No. 2 and a No. 7 Outfit model if they wish, but no competitor can win more than one prize.

Competitors should try to think out a model that is really new and original, and it is always well to remember that many of the highest awards in recent contests have been gained by competitors who have chosen quite simple subjects for their models.

The prizes to be awarded in each Section of the Contest are as follows: First, Cheque for £3/3/–; Second, Cheque for £2/2/–; Third, Cheque for £1/1/–; Five Prizes each consisting of a Postal Order for 10/6; Five Prizes each consisting of a Postal Order for 5/–.

A number of Certificates of Merit also will be awarded in each Section.



A robot marionette built from Meccano parts by J. A. Dale, Hatfield. All the limbs and the neck are pivoted, and the figure performs in a most life-like manner by operating the control strings.

It is only necessary to send either a drawing or a photograph of the model. Competitors must enclose with their entries a list of parts used in their models, and must write their ages, names and addresses on the back of each photograph or drawing sent in.

Entries should be addressed *"March Outfit Competition, Meccano Ltd., Binns Road, Liverpool 13."* A letter A, B, C or D must be marked in the bottom left-hand corner of the envelope to indicate the Section for which the entry is intended.

Readers wishing to take part in the Home Sections A and B should send in their entries as soon as possible as these Sections will remain open only until 30th April, 1952. The closing date for entries in the Overseas Sections C and D is specially extended to 31st July, 1952, so that readers living Overseas will have ample time in which to build their models and submit them.

Prizewinners will be notified by letter as soon as possible after the closing dates.

A Fine New Meccano Model

Combined Concrete Carrier and Bulldozer

FOR the subject of this month's new model I have chosen an exceptionally interesting machine designed for use on building sites. The model is seen in Fig. 1. It is a small tracked vehicle fitted at one end with a bulldozing blade, which is used for preparatory work in clearing the site, and at the other end with a large hopper, in which concrete or cement can be transported from the mixing machines to the required position. An important feature is that the controls and the driver's seat are reversible, so that the driver can always face the direction in which the machine is travelling. The model is driven by an E20R Electric Motor and is equipped to carry out all the essential operations performed by the actual machine.

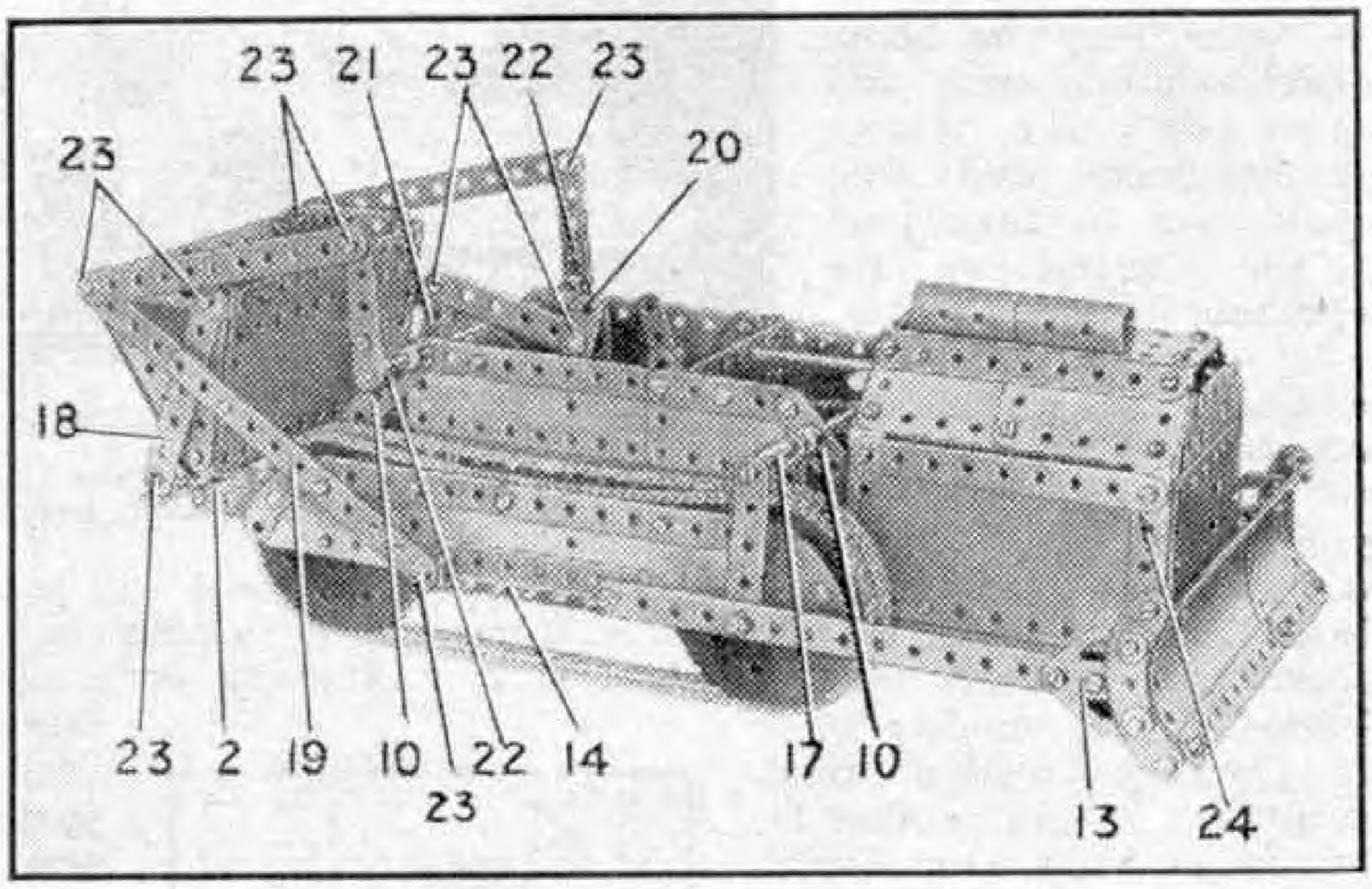


Fig. 1. A combined bulldozer and concrete carrier designed for use on large building operations.

The chassis of the model consists of two 12½" Angle Girders connected together by two 5½" Angle Girders 1 bolted in the positions shown in Fig. 2. The chassis is extended at the hopper end by two built-up girders 2, each of which is assembled from two 5½" Strips that overlap the 12½" Angle Girders by five holes. A 3½" Angle Girder 3 is bolted on each side to the Girders 1, and 7½" Strips fixed to the Girders 3 serve as the outer bearings for the axle shafts. The inner bearings are provided by the 12½" Angle Girders of the chassis. A casing consisting of two 5½" × 1½" Flexible Plates overlapped, and two Semi-Circular Plates, is attached to each of the 7½" Strips, and is edged by Strips and Curved Strips as shown.

An E20R Electric Motor is attached to the chassis by two Double Brackets on one side, and on the other by a 3½" Angle Girder 4 extended by a Flat Girder. A ½" Pinion on the Motor shaft engages a 57-tooth Gear 5 fixed on a Rod mounted in the Motor side-plates. On the lower end of this Rod is a Worm 6 that engages the 57-tooth Gear of the differential. This Gear is fitted with two ¾" Bolts held in place by nuts. A 1½" Rod is held in a Collar screwed on the end of each Bolt, and a Coupling is fixed on the Rod between the Collars. Two Rods, forming what are known as the half-shafts, are mounted as shown in Fig. 2, and each is free to rotate in the longitudinal bore of the Coupling. Two ¾" Pinions turn freely on Pivot Bolts screwed into the Coupling, and they engage ¾" Contrates fixed on the half-shafts.

Two Rods forming idler axles are mounted in the same way as the driving axle, and each is fitted with a 1½" Pulley 7. The tracks are represented by lengths of Sprocket Chain passed round 3" Sprockets.

The front and rear divisions of the driving compartment are formed by 3½" × 2½" Flanged Plates bolted to the Girders 1, and the sides are fixed to the flanges of these Plates. Each side is assembled on a 12½" Strip bolted to the Flanged Plates immediately above the Girders 1. These Strips support two more 3½" × 2½" Flanged Plates 8 and 9 (Fig. 2), and 2½" Strips 10 bolted at a slight angle. The upper ends of Strips 10 are connected by 5½" × 1½" and 2½" × 1½" Flexible Plates edged by Strips.

The model can be steered in either direction by applying a brake to one of the tracks. Each brake consists of a length of Cord tied at one end to Girder 1, passed round the Pulley 7 and fastened to a lever 11 in the driving

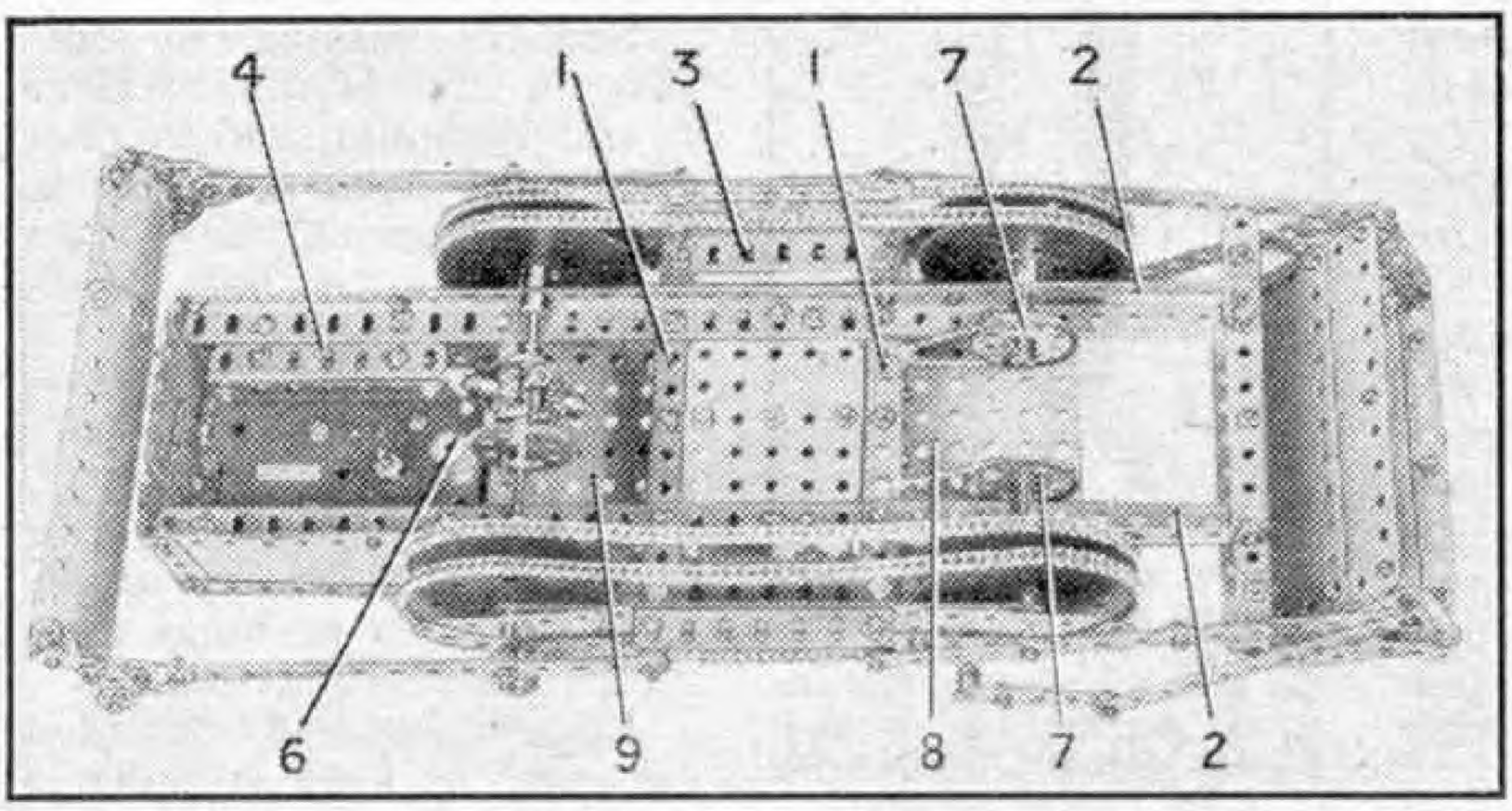


Fig. 2. The bulldozer and concrete carrier seen from underneath.

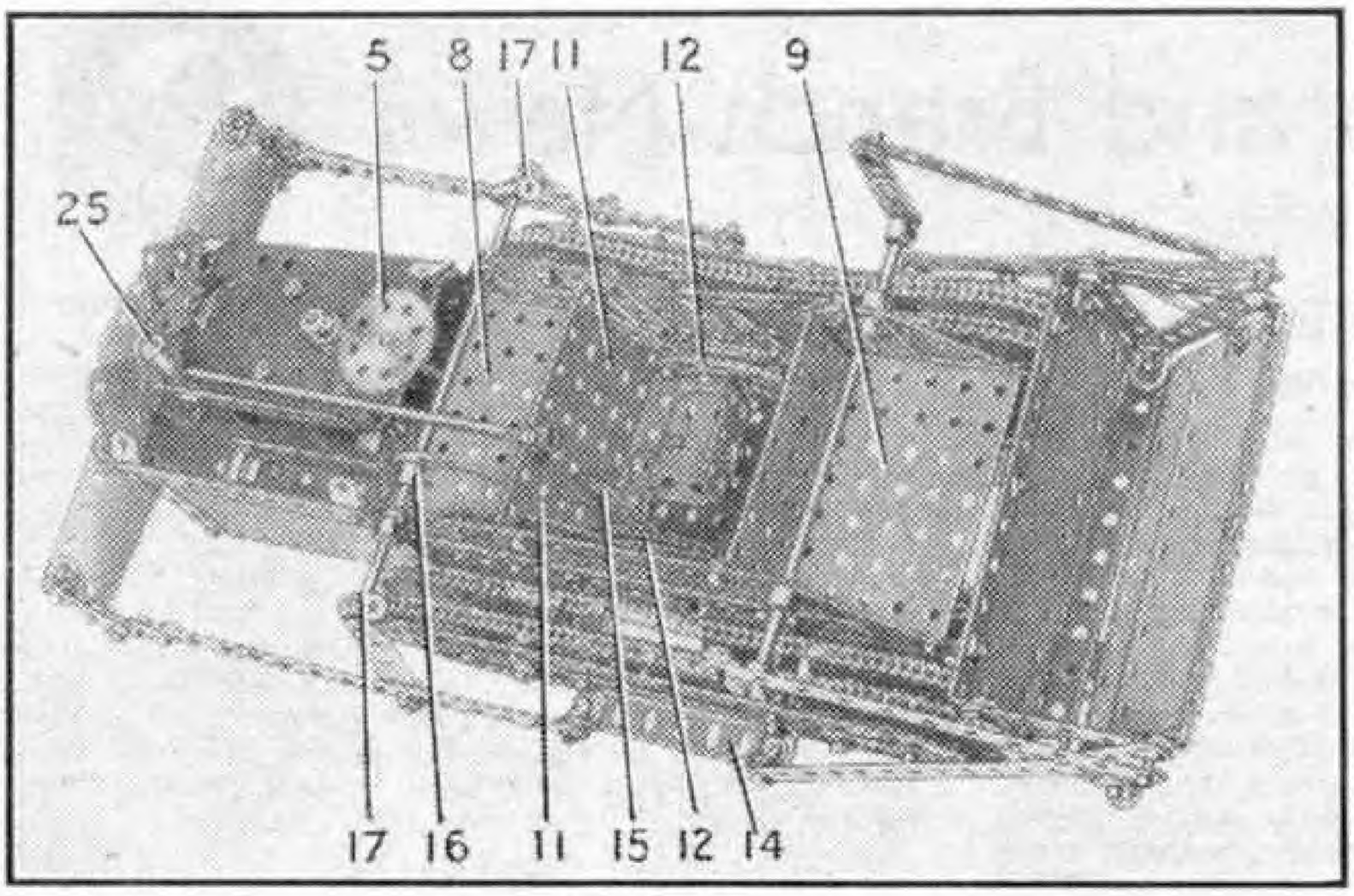


Fig. 3. This plan view of the model shows the arrangement of the driving Motor and details of the cab.

compartment. The lever is a 3" Strip and it is lock-nutted to an Angle Bracket bolted to the chassis. It operates in a quadrant 12 formed by two $2\frac{1}{2}$" Stepped Curved Strips fixed to the side by $\frac{1}{2}$" Bolts.

The bulldozer blade is made from a $5\frac{1}{2}" \times 2\frac{1}{2}"$ Flexible Plate and a $2\frac{1}{2}" \times 2\frac{1}{2}"$ Flexible Plate bolted together and edged by Strips. The blade is curved to shape and attached by Angle Brackets to $2\frac{1}{2}"$ Stepped Curved Strips. Each of the Curved Strips is fitted with a Flat Trunnion 13, and these are fixed to $7\frac{1}{2}"$ Strips pivoted on lock-nutted bolts to Angle Brackets fixed to $3\frac{1}{2}"$ Angle Girders 14. These Girders are attached to the Angle Girders 3.

The blade can be raised by operating a lever 15, which is a 3" Strip lock-nutted at its lower end to an Angle Bracket fixed to the chassis. A length of Cord tied to the lever is attached to one arm of a Double Arm Crank 16 that is fixed to a Rod passed through two of the Strips 10. A Coupling 17 is locked on each end of the Rod, and these are connected by $2\frac{1}{2}"$ Strips and lock-nutted bolts to the arms supporting the blade.

Each end of the hopper consists of a triangular framework made from a 3", a $3\frac{1}{2}"$ and a $2\frac{1}{2}"$ Strip, and the ends are linked by $5\frac{1}{2}" \times \frac{1}{2}"$ Double Angle Strips. The sides are $5\frac{1}{2}" \times 2\frac{1}{2}"$ Flexible Plates, and the hopper is supported by two pivoted arms on each side. One of these is a $3\frac{1}{2}"$ Strip 18, attached to an Angle Bracket fixed to a $7\frac{1}{2}"$ Strip bolted across the girders 2, and the other is a built-up strip 19 formed by two $5\frac{1}{2}"$ Strips overlapped seven holes. Strip 19 is lock-nutted to an Angle Bracket bolted to the Girder 14.

The hopper can be tipped by moving a lever 20. This consists of a 3" Strip pivoted to the side, and it is linked by a further 3" Strip to a Crank 21. Crank 21 is fixed on a Rod mounted as shown in Fig. 4, and this Rod is fitted with further Cranks 22 extended by $2\frac{1}{2}"$ Strips, and the $2\frac{1}{2}"$ Strips are connected to the hopper by $5\frac{1}{2}"$ Strips. The bolts marked 23 in the hopper linkage are lock-nutted.

The sides of the engine housing are $4\frac{1}{2}" \times 2\frac{1}{2}"$ Flexible Plates bolted to the chassis Girders and to a $2\frac{1}{2}"$ Angle Girder 24 on each side. The E20R Electric Motor switch is extended by a $1\frac{1}{2}"$ Strip attached to it by a lock-nutted bolt, the other end of the Strip being pivoted on a bolt fixed in a Coupling 25. This Coupling is carried by a Rod passed through an Angle Bracket bolted to the Motor, and through one of the $3\frac{1}{2}" \times 2\frac{1}{2}"$ Flanged Plates. An operating lever on the Rod is provided by a Collar fitted with a Bolt.

Each side of the engine housing is completed by two $2\frac{1}{2}" \times 1\frac{1}{2}"$ Flexible Plates connected to the sides by Obtuse Angle Brackets. The top is formed by two $3" \times 1\frac{1}{2}"$ Flat Plates and this is also bolted to Obtuse Angle Brackets. The radiator consists of two $2\frac{1}{2}" \times 2\frac{1}{2}"$ Flexible Plates overlapped three holes, a $2\frac{1}{2}" \times 1\frac{1}{2}"$ Flexible Plate and two Flat Trunnions. The floor of the driving compartment is a $2\frac{1}{2}" \times 2\frac{1}{2}"$ Flat Plate fixed to a $3\frac{1}{2}"$ Strip bolted across the Girders 1. The driver's seat is made from two $1\frac{1}{2}"$ Flat Girders connected by an Angle Bracket, and it is pivoted on a $1\frac{1}{2}" \times \frac{1}{2}"$ Double Angle Strip bolted to the floor.

In fitting the track Chains care should be taken to see that each of them has approximately the same tension.

Parts required to build Bulldozer and Concrete Carrier: 2 of No. 1; 8 of No. 1b; 15 of No. 2; 5 of No. 2a; 6 of No. 3; 7 of No. 4; 15 of No. 5; 1 of No. 6a; 2 of No. 8; 2 of No. 9; 5 of No. 9b; 2 of No. 9d; 2 of No. 11; 21 of No. 12; 8 of No. 12c; 3 of No. 14; 1 of No. 16; 4 of No. 16a; 1 of No. 18a; 1 of No. 21; 2 of No. 25; 2 of No. 27a; 2 of No. 29; 1 of No. 32; 183 of No. 37; 38 of No. 37a; 32 of No. 38; 1 of No. 40; 1 of No. 48; 2 of No. 48d; 4 of No. 53; 9 of No. 59; 3 of No. 62; 1 of No. 62b; 4 of No. 63; 1 of No. 72; 2 of No. 73; 12 of No. 90a; 2 of No. 94; 8 of No. 95b; 1 of No. 103f; 2 of No. 103h; 6 of No. 111; 6 of No. 111a; 6 of No. 111c; 4 of No. 126a; 2 of No. 163; 9 of No. 188; 4 of No. 189; 3 of No. 190; 2 of No. 191; 5 of No. 192; 4 of No. 214; 1 E20R Electric Motor.

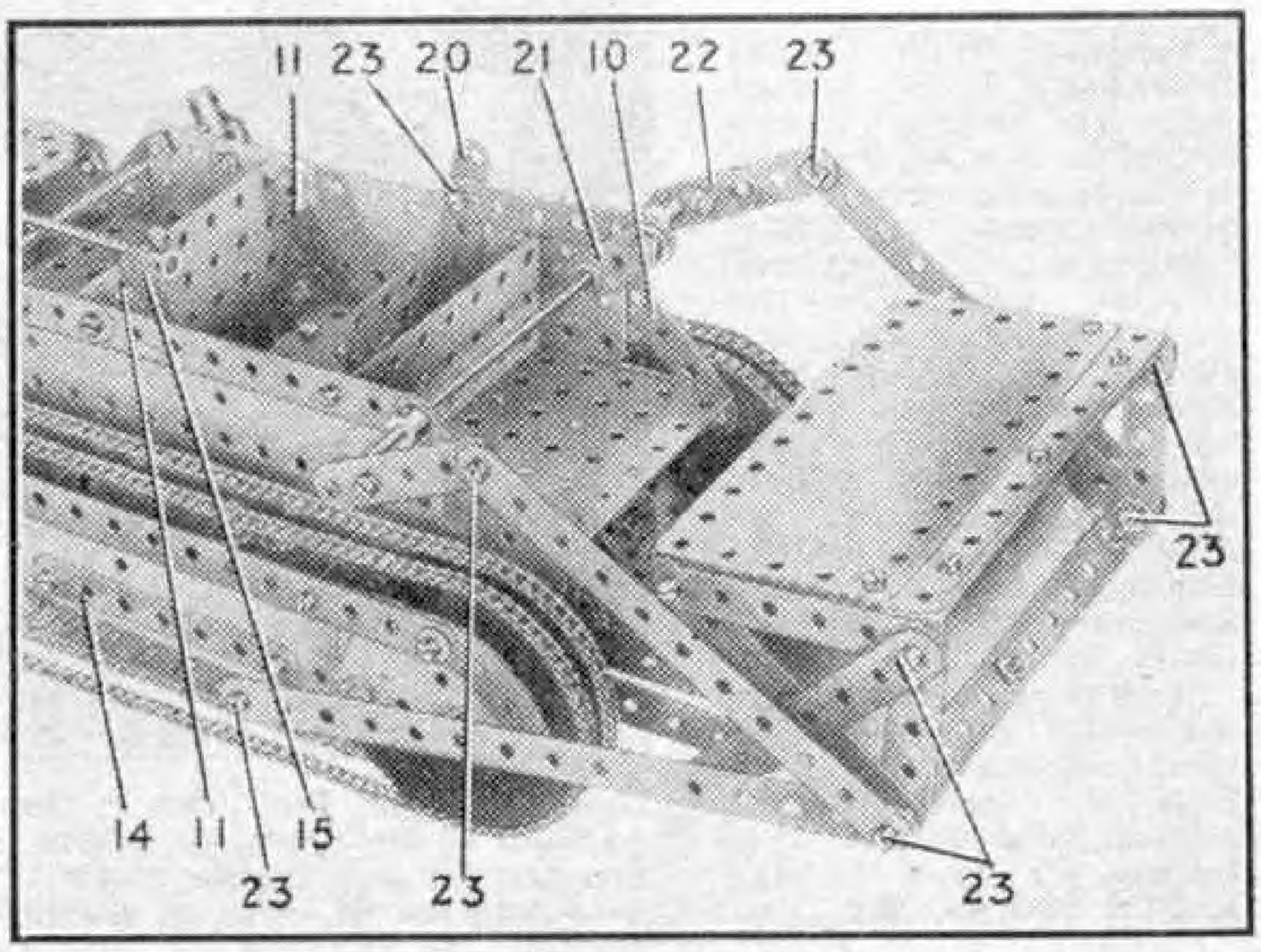


Fig. 4. A rear view of the model showing details of the concrete hopper.

Club and Branch News

WITH THE SECRETARY

FUN OUT OF DOORS

April is one of the months in which we reach a time of change. In most cases we are still in the Club or Branch Room, probably completing preparations for an Exhibition of models or display of train operations to mark the end of the Winter Sessions, but we are thinking more and more of outdoor events as the days grow longer.

Officials of both Clubs and Branches should be fully prepared to take advantage of the enthusiasm for outdoor pursuits of various kinds that the change of season brings with it. There is no lack of possibilities. Railway enthusiasts can visit places of special interest from the point of view of their hobby, perhaps to see a famous named train that runs reasonably near Club or Branch headquarters, or to visit some locomotive depot, goods yard or even a fairly large station, where there is always much of interest to be seen. Club enthusiasts may visit works, or make their way to the scenes of building, open-cast mining or similar operations, where they are likely to find good subjects for future model-building.

Good Club and Branch members also deserve pure enjoyment and recreation. For this reason the summer programme should always include a visit to some seaside or other resort where they can play games and generally enjoy "all the fun of the fair."

The next question of course is: "Who is going to pay for all this?" Well, the answer is comparatively easy. To begin with, it is not necessary or advisable to arrange visits or excursions that require a large outlay. In the second place, to help members to cover costs easily it is best to arrange an Excursions Savings Scheme, in charge of a Senior member. It is surprising how far the small but regular contributions of such a scheme go towards meeting all requirements. Where the proceeds of Exhibitions or other displays are available, visits of special interest or importance could be subsidised from Club funds.

CLUB NOTES

BARKERS' BUTTS COUNTY SECONDARY BOYS' SCHOOL M.C.—The Eighth Annual Exhibition was on the usual extensive scale and achieved a great success. The display included a model fairground, a reaper and binder and other working models, and Hornby and Hornby-Dublo Train Sets also were seen in operation. Nearly 1,000 visitors thoroughly enjoyed the show. Club roll: 80. *Leader:* Mr. F. Batten, Barkers' Butts County Secondary Boys' School, Banks Road, Coventry.

BORDEN GRAMMAR SCHOOL M.C.—This fine Club will soon celebrate its 23rd Birthday. Recent events have included Parents' Day Display, a visit to the Kemsley Paper Mills and "Twenty Questions" Contests. A good number of new members have joined. Club roll: 30. *Secretary:* D. Colthup, 20, Wearside Avenue, Sittingbourne.

HORNSEA M.C.—Excellent work continues on the usual lines. Members enjoy Model-Building Evenings, and other events have included Film Shows, Debates and Talks. Mr. Dunn, father of one of the members, gave an interesting Lantern Lecture based on his experiences in the first World War. Club roll: 15. *Secretary:* Mr. R. W. Harris, "Ty-Olaf," Victoria Gardens, Hornsea, E. Yorkshire.

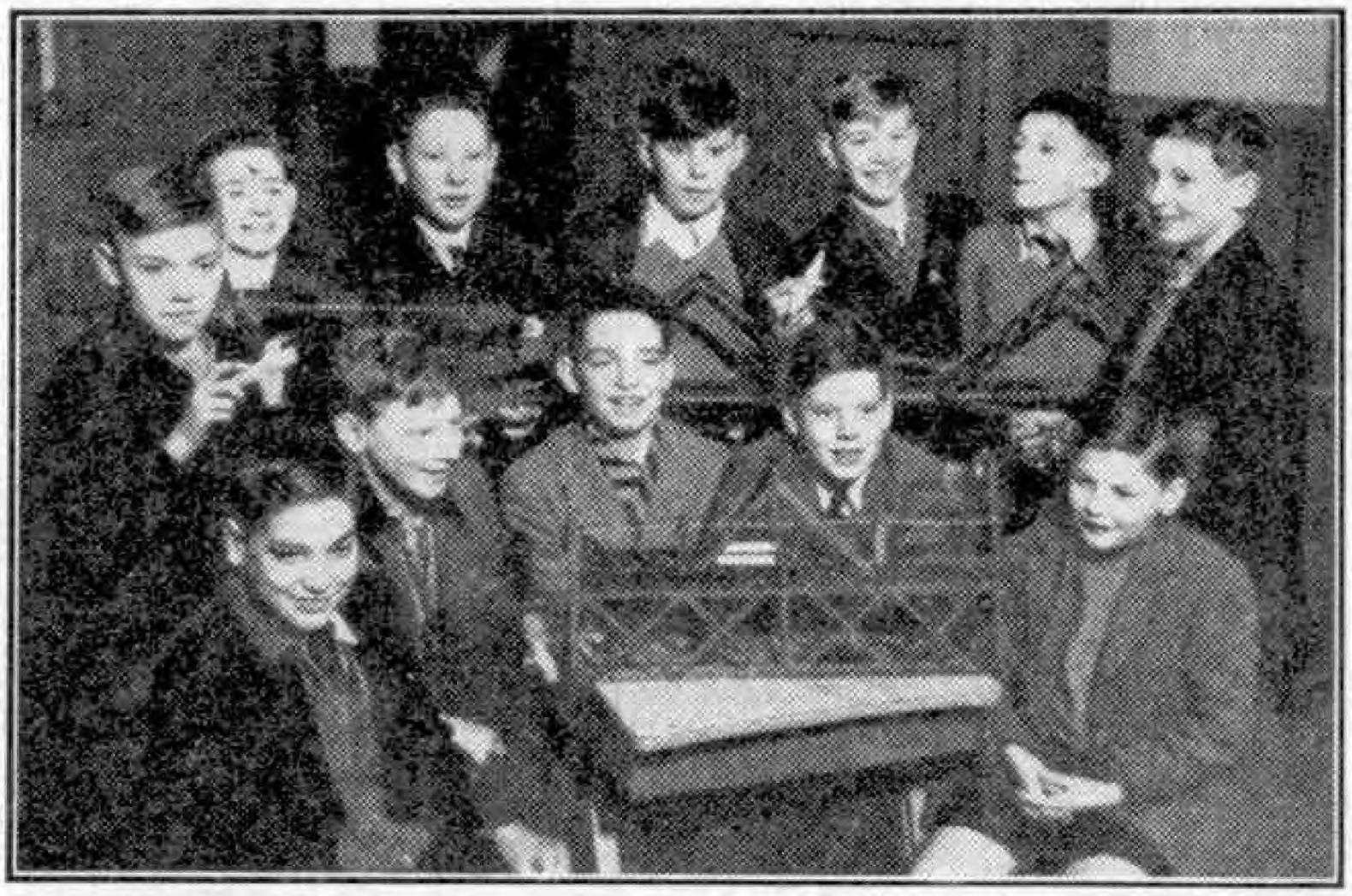
NEWPORT (FIFESHIRE) M.C.—Meetings have been very successful, and a Club Party has been held. A Film Show also was greatly enjoyed and a Visit has been paid to the Works of the National Cash Register Company, in Dundee. *Secretary:* Mr. Percy Fekety, Dunearn, Newport, Fife, Scotland.

AUSTRALIA

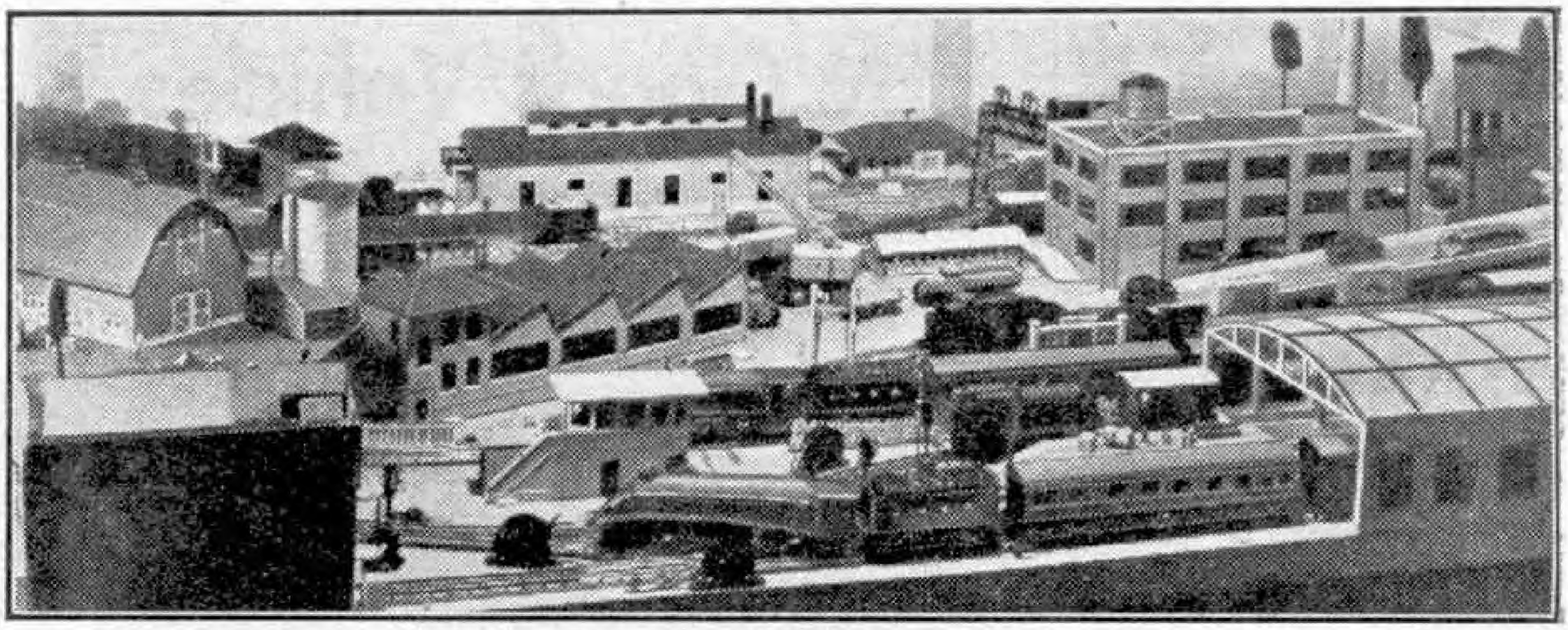
THEBARTON BOYS' TECHNICAL SCHOOL M.C.—Meetings have been devoted to constructional work, and in addition there have been competitions in which entries were built at home by members. In these contests carefully built models of tractors, cars and bridges have been entered. Visits have been paid to railway workshops. Club roll: 27. *Leader:* Mr. L. Gare, B.Sc., Dip.Ed., Thebarton Boys' Technical School, Thebarton, South Australia.

BRANCH NEWS

RYDAL SCHOOL—An outstanding feature of the programme during the Winter Sessions was an address by Mr. Paton, one of the Honorary Vice-Presidents, on topics of current interest in the railway world, including references to recent discussions on nationalisation. Three railway films have been shown. One was a colour film dealing with the evolution of the locomotive, and was displayed through the good offices of Mr. Lermit. *Secretary:* Mr. J. D. Hall, Rydal School, Colwyn Bay.



Club life is real fun! This is clearly shown by our photograph of smiling members of the Tynecastle School (Edinburgh) M.C., in which Brian Hoxton, Secretary, is seen in the middle of the front row. The Club is under the Leadership of Mr. Wm. C. Stephen, and has had a long career of steady progress. All members are eager model-builders, and other hobbies in which they are interested include woodwork and table top photography.



HORNBY RAILWAY COMPANY

By the Secretary

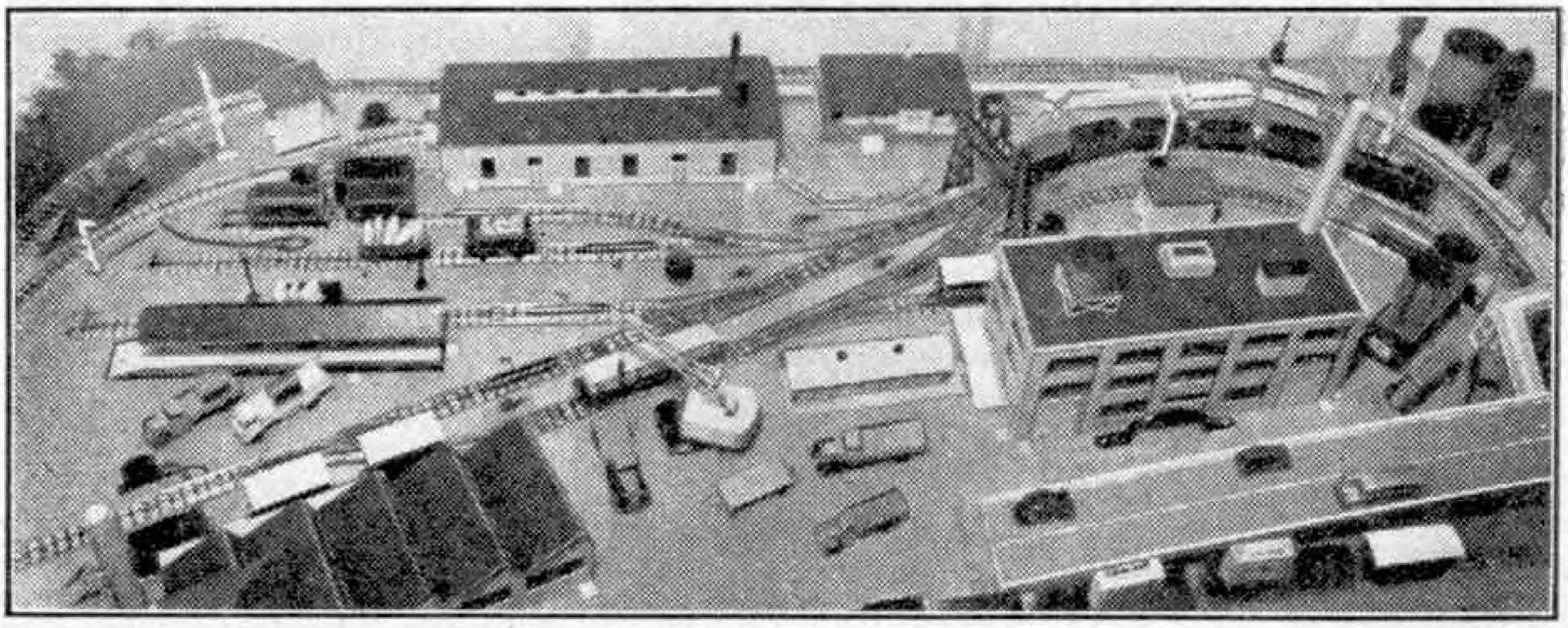
A Fine Goods Yard Layout

I am always pleased to hear about members' layouts, to read how it is proposed to improve and develop them and to answer any queries that may arise regarding layout and operation. In this way I feel that I am keeping in touch with an ever-widening circle of friends and helping them to enjoy the best possible use of their equipment.

That is one reason why I am delighted to include on this page the accompanying pictures of the Hornby-Dublo layout installed by Captain F. M. Womersley, Wareham, Dorset, for with this he and his son Marcus have a tremendous amount of fun and other members no doubt will get ideas from it for their own layouts. The lower view particularly illustrates various useful points in connection with yard layout. Notice how the sidings are laid so that reverse curves are almost entirely avoided. The diagonal reception and run-round roads have the siding Points leading straight off them. There is sufficient length, too, between the outer main line and the first set of siding Points to allow of shunting movements being made without encroaching on the main line; in fact such a movement is seen in progress in the picture.

Another point of special interest is the placing of the Uncoupling Rails. Where to put these important pieces of mechanism is a question that often arises in the course of building up a layout. On the system shown they are not placed too close to the Points leading to each siding, but their position is such that they give any wagons shunted off a reasonable chance of coasting along the siding in a realistic manner. It is possible to shunt off a couple of vehicles fairly smartly so that they will run well clear of the Uncoupling Rail, while in later movement, carried out more gently, a further wagon or two may be detached on the same road to stop short of the others. The ability to do this is often very useful when movements including several separate sets of wagons—"cuts" is the technical term—are being carried out.

Closely linked with this subject is the placing of the Isolating Rail. This and the Uncoupling Rail are included in many of the layouts in the Hornby-Dublo publication "*Rail Layout Suggestions*," for the guidance of enthusiasts, but individual requirements vary. Although both are usually required in sidings, the movements planned on a system may require their placing in the main line as well.

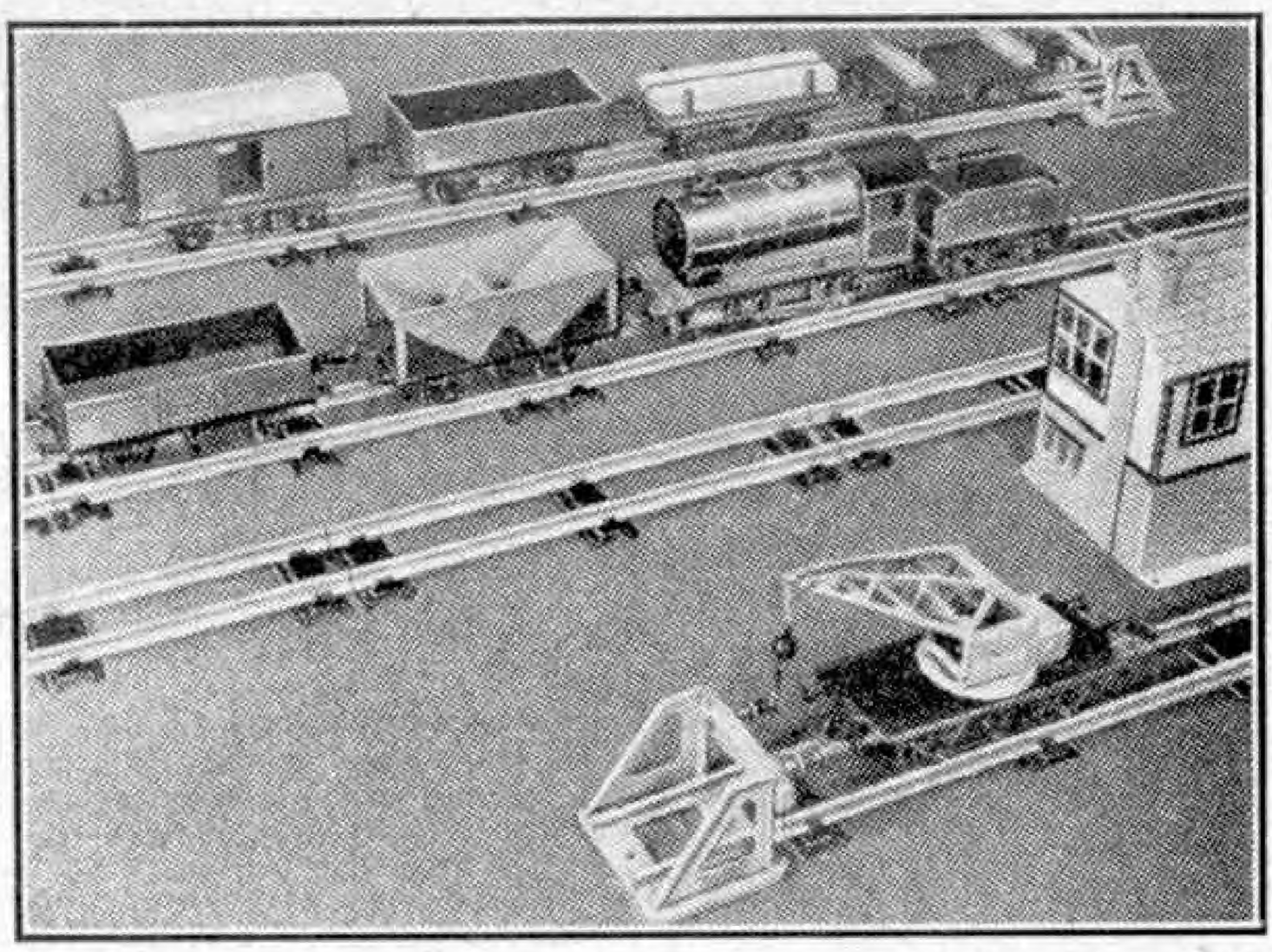


These pictures show parts of the Hornby-Dublo Railway developed by Captain F. M. Womersley, and his son Marcus, of Wareham, Dorset. The rail layout is very practical, and the whole system has a realistic appearance.

Using Hornby Goods Vehicles

ON practically any railway journey one is nearly always struck by the amazing variety of wagons to be seen, for railways have to be able to handle almost any type of traffic. To a certain extent this variety is reflected in the Hornby System and the owner of a Hornby railway can make up his trains to include vehicles of many different types.

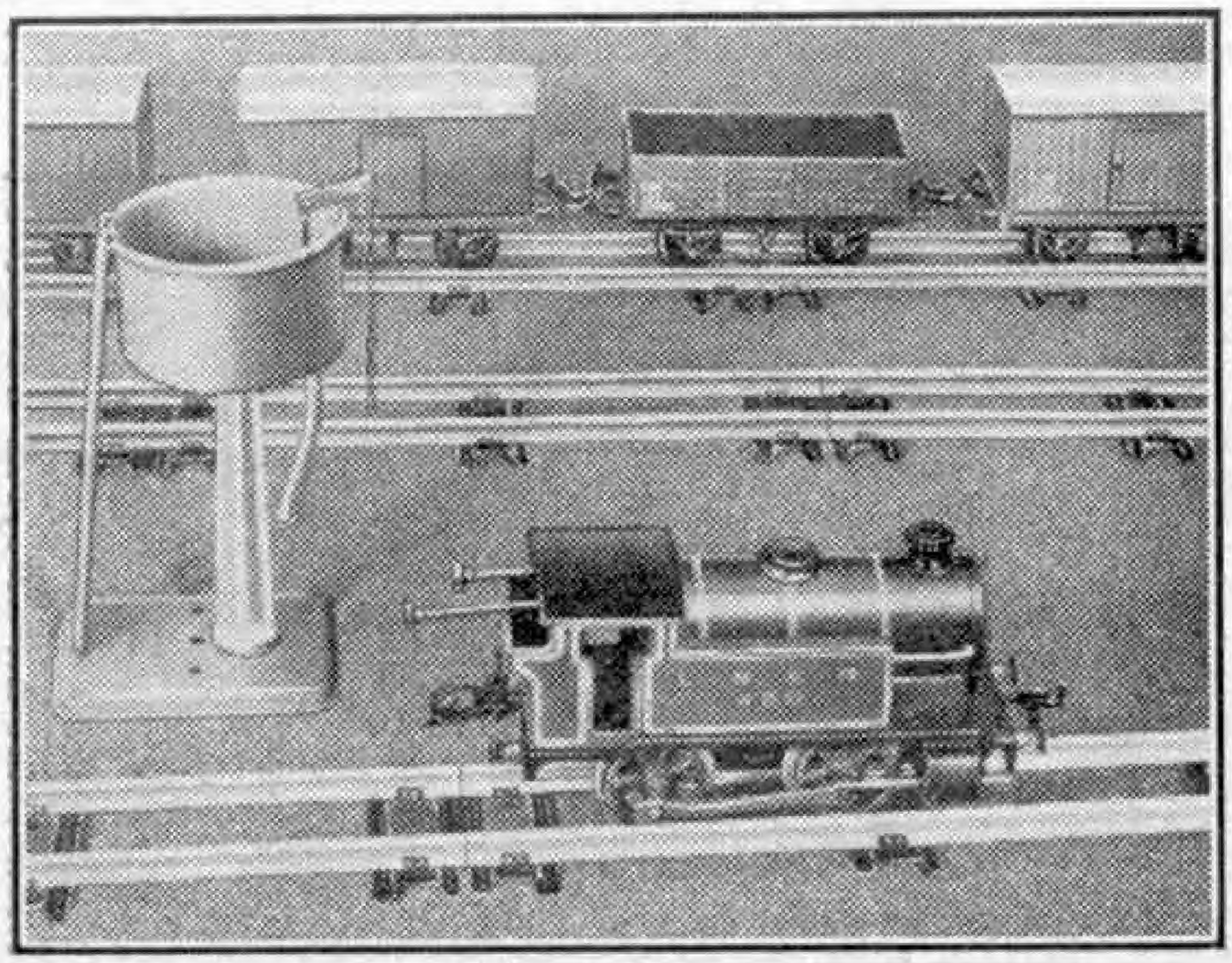
In arranging to run any particular train it is as well to consider the purpose of the individual vehicles. Thus coal and mineral wagons are usually found together, and such wagons generally keep to their recognised main line runs, as do most of those for specialised traffics. So the more important freight trains on a miniature layout will tend to be composed of Wagons or Vans of similar kinds. For example, the express freight trains that run to convey various kinds of perishable traffic can be represented by an assembly of Goods Vans and, perhaps, Refrigerator Vans. Similarly Hornby Open Wagons and Hopper Wagons can run together in coal or mineral trains.



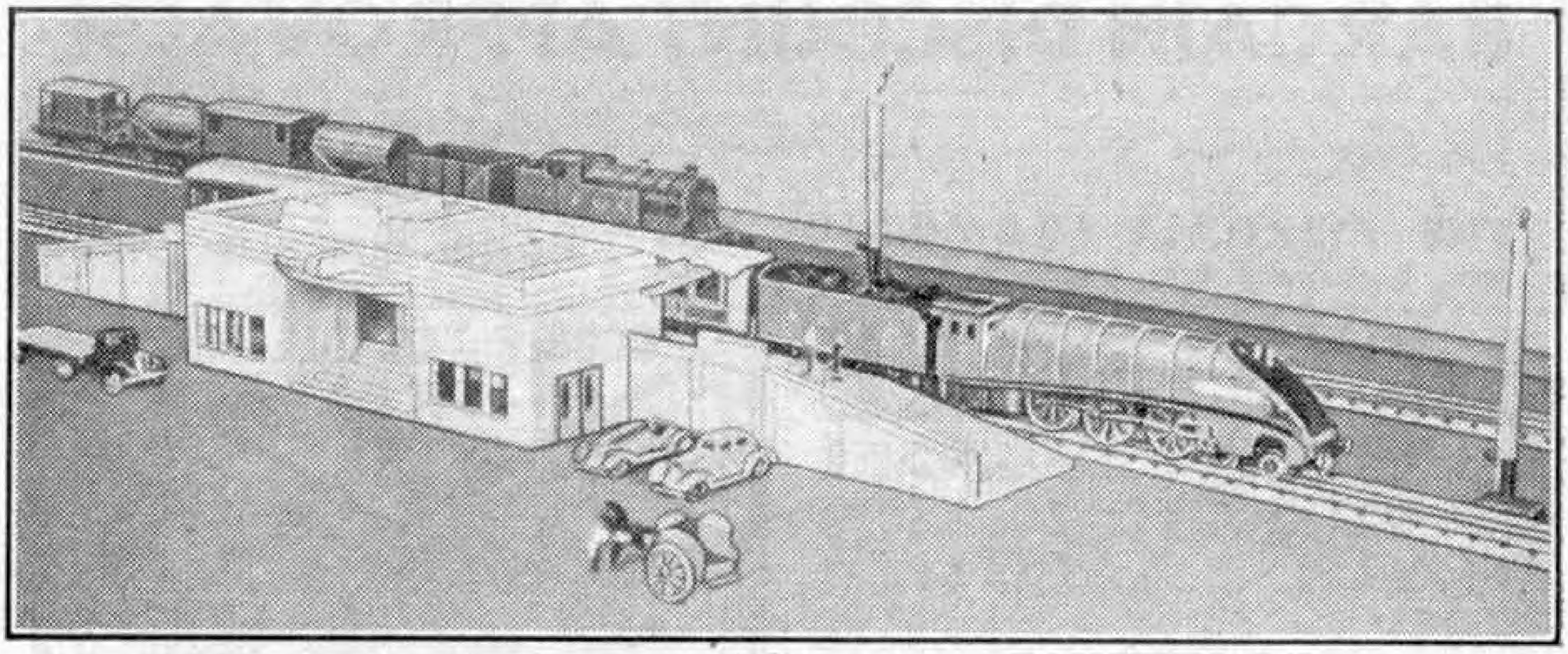
A selection of Hornby goods rolling stock appears in this picture. The Crane Truck stands by the Buffer Stop in the foreground, ready for emergencies.

On small layouts the general goods train is the type usually followed, as there may not be more than one example of a particular kind of wagon on the railway. Even if there were whole trains of, say, Milk Vans, there might not be sufficient siding space for them. In running miniature mixed goods trains it adds to the fun if we assume that certain vehicles are fitted with automatic brakes, and these can then be grouped together next to the engine. There are many such trains in real practice nowadays, and they are usually termed "partially fitted" to distinguish them from the more important "fully-fitted" express freight trains, which are braked throughout. In general, any of the Hornby Vans can be considered as braked.

It is important in any programme of goods train working not to forget the Goods Brake Van and to see that it carries its correct tail and side lamps. The placing of these little fittings in position before the train leaves gives a realistic air to the proceedings. Similarly, the engine should carry the correct headlamps.



The Hornby 101 Tank Locomotive in yard service. The engine is waiting by the Water Tank for further work.



Extending a Hornby-Dublo Oval

THIS simple yet attractive Hornby-Dublo layout has been developed by Mr. E. W. Webster, of Leyton, London E.10, for his children Peter and Pamela. But in practice there are three enthusiasts to share the working of the line, and it is difficult to say which of them is the keenest!

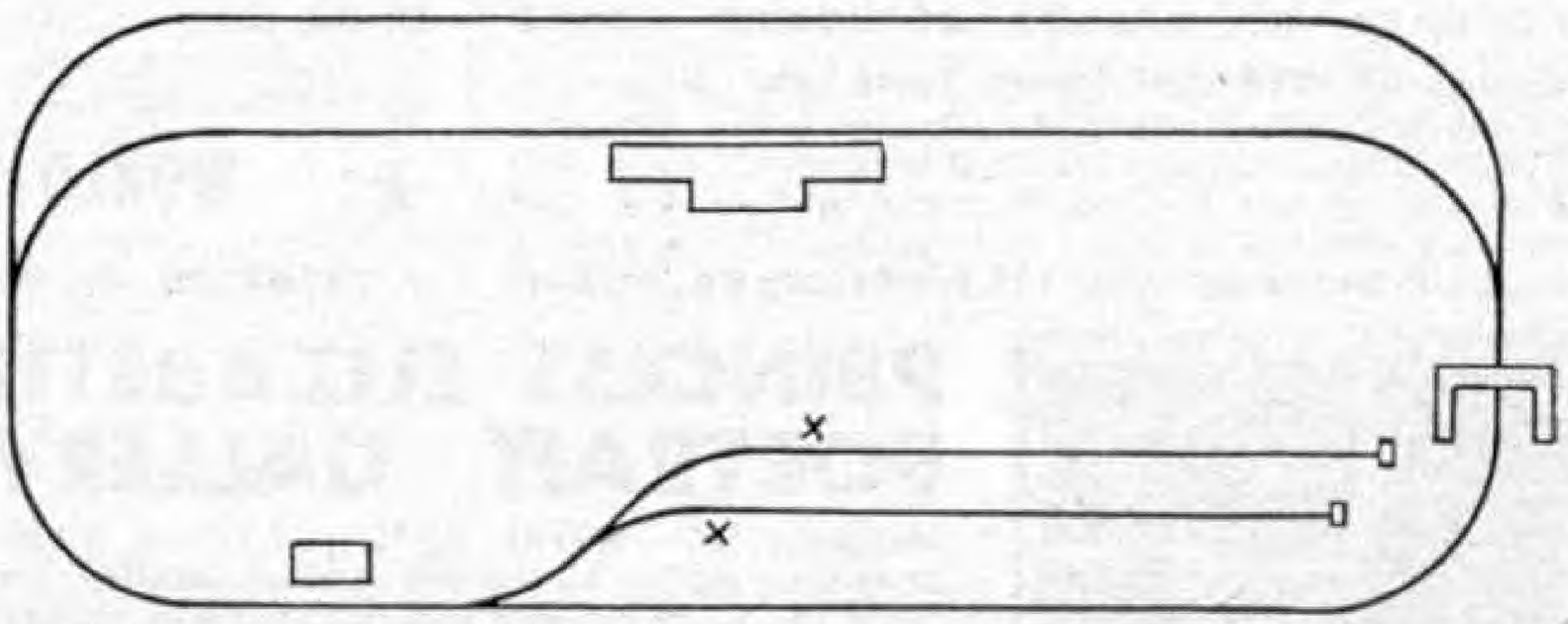
The track occupies a space of 8 ft. by 4 ft. and is kept screwed down to a baseboard that can be stored when not in use. This arrangement keeps the rails in alignment and saves time when a spell of train running is to take place, for the baseboard is soon set up and it does not take long to place the accessories in position and to connect up the Transformer and Controller.

The railway is a simple but effective development from the small oval layout contained in every Hornby-Dublo Train Set. The track is still oval in shape, but its increased length and width provide better opportunities for train running. In addition to the outer main line there is an alternative inner main track along one side that serves a Hornby-Dublo through Station. Each of the two sidings is provided with Isolating Rails and an Uncoupling Rail. This makes it possible to have two trains on the track, but only one of them can be run at one time. The one not in use for the moment has to be held in one or other of the sidings, which is cut out electrically by means of the Switch connected to the Isolating Rail in the siding concerned.

As the diagram shows, a Signal Cabin is placed near to the Points leading to the sidings so that the "signalman" can keep an eye on movements into and out of the yard. The signalling system is not elaborate, but there are enough standard Hornby-Dublo Signals to provide for the usual train movements. A Loading Gauge stands at the entrance to the sidings and there is a Water Crane placed between the two siding tracks so that it can serve engines standing on either of them.

Fast passenger work is carried out by a "*Sir Nigel Gresley*" 4–6–2, with L.N.E.R. type rolling stock. The goods work and mixed traffic are handled by a G.W.R. Tank and a nicely varied selection of goods vehicles is in use.

Altogether this happy little layout gives great enjoyment to its owners.



The illustration at the head of the page shows the simple but well-arranged Hornby-Dublo railway of Mr. E. W. Webster of London E.10 and here is its layout. Good effects have been obtained with standard equipment. The "X" alongside each siding marks the position of the Uncoupling Rails.

For other Stamp Advertisements see also pages 186 and xvi.

Stamp Collectors' Corner

F. E. Metcalfe

THE ISLE OF CLOVES

THE recent announcement by the Crown Agents that a new set of stamps is in preparation for Zanzibar impels us to see if any stamps of the current set are missing from our collections. Just take that look right now, for those missing stamps will cost a lot more later on.

Zanzibar is a specialist's country, speaking from a philatelist's point of view, and it is a question if there are in existence a dozen complete collections, containing all varieties of overprint, etc. The difficulty of attaining completion has had a lot to do with the relative unpopularity of Zanzibar stamps. This neglect is to be regretted, for a collection on simplified lines is not only easy to make, but also is worth having. One specialist once said "Zanzibar is such a romantic sounding country to British people, that whenever I wish to show any stamps to a non-collector I always bring out my Zanzibar; and interest is always aroused in the portraits of the various sultans of Zanzibar, even if the stamps themselves do not appeal."

Perhaps I look with a more kindly eye on Zanzibar than most people. This is because I once lived there for some months, when I was young and impressionable. The Isle of Cloves, as Zanzibar is called, certainly looked romance itself at that time. How unforgettable those nights spent sitting on the roof, with that huge African moon overhead—how huge it seems must be seen to be realised—the soft breezes coming in from the Indian Ocean, and the gentle rustle of palms.

Yes, Zanzibar is sheer romance, but we must be getting down to the stamps. Before doing so we had better just take a peep at the map to make sure that we know exactly where it lies. The Protectorate of Zanzibar, which includes the substantial island of Pemba, lies about 23 miles off the coast of Tanganyika, which in turn is situated on the east coast of Africa. Zanzibar is a coralline island, and as it is not far south of the Equator, the climate is tropical. But there is a 60-inch yearly rainfall, and while it gets piping hot during the day, those sea breezes already referred to make the nights a delight.

Cloves and coconuts are the chief exports, and those who have had the good fortune to walk through a clove grove just after rain have enjoyed one of the greatest delights this world contains, for the aroma is unbelievable. That of course is when the clove trees are in bloom. It is hard to believe that a small white flower can distil so glorious a scent.

The first stamps used in Zanzibar were Indian, and these with Zanzibar postmarks are much sought after. Later these Indian stamps were overprinted Zanzibar. At least that was the idea, but all kinds

of mistakes were made with the overprint, and copies can be found which read Zanzidar, Zanizbar, Zanzibarr and all other kind of combinations. In fact no overprints have been more maltreated, and of course some of them are rare and cost a lot of money.

After the Indian overprints Zanzibar brought out a set of its own, and the portrait of Sultan Seyyid Hamed bin Thwain, the then reigning monarch, appeared on the stamps. These appeared in 1896 and the same design was used until 1899, but in 1898 the watermark was changed from a single rose to what is known as a multiple rose. In September 1899 there was a new Sultan and this meant a new portrait.

Apart from one or two more overprinted stamps, nothing more happened in the philatelic field until 1904, when portraits were dropped—and the monogram—a most elaborate affair—of the new Sultan was used. In 1908 Sultan Ali bin Hamoud appeared on all stamps up to 5 rup., and a view of the Sultan's Palace taken from the sea appears on stamps from 10 rup. to 200 rup. Yes, 200 r., for believe it or not stamps of this face value, about £15, were printed, and now have a catalogue valuation of £150. I slept many a night at the top of the tower that can be seen in this Palace view.

This Sultan was apparently more friendly to Germany than he was to Great Britain, and in 1913 his place was taken by the present Sultan, Kalif bin Harub, a kindly courteous gentleman, very different from his predecessor, as his portraits show. His first stamps showed his portrait as he then was. They also showed a fishing canoe. How wonderful it used to be seeing these small craft speeding back to port before the wind. On the higher values we got a picture of an Arab dhow.

When the stamps first appeared in 1913 they had the multiple rose watermark, so be sure to check the watermarks on your stamps. A year later the mult. Crown C.A. watermarked paper was used. In 1926 a later portrait of the Sultan was used, but values from 1 rup. upwards continued with the same design.

Since 1936 Zanzibar has had five commemorative sets. The first was to celebrate the Silver Jubilee of the Sultan. The design is very interesting, showing as it does in the background a carved Arab door. These doors are often very beautifully carved and are always interesting, and being made mostly of teak, they will last almost indefinitely.

The second commemorative set appeared in 1944 to mark the bicentenary of the Ali Busaid Dynasty. The present Sultan is of the same family. The other set were to commemorate Victory, the Royal Silver Wedding and the 75th Anniversary of the U.P.U. That brings us up to date, but to repeat what was said at the beginning, fill your blanks up now!

For other Stamp Advertisements see also pages 184 and xvi.

Stamp Gossip

OLD VERSUS NEW

AS was to be expected, the new stamps that Australia is releasing are not pleasing everyone, and a valued correspondent from "down under" has written in rather strong terms against the 3½d. value, which came out last November. Well, it does not surprise me that this stamp is meeting with some opposition, but I would be surprised if I learned that the majority of Australian collectors do not think that the new stamps are a great improvement on those they have replaced. If I were asked which was the poorest design of any Commonwealth stamp issued during the past five years I would plump for the one illustrated here, and the other values which were emitted from 1942 to 1943 are in my humble opinion not much better. Personal prejudice perhaps, but there are others who think the same. A director in an Art School recently remarked that "Australia has gone, in ten years, from the bottom to the top of the stamp designing class."

Meanwhile more values, 4½d. and 6½d., of the stamps objected to have appeared, but now of course they will not have a long life, so make sure of your copies.

IMPRINT BLOCKS

A young collector recently asked what imprint blocks were. Needless to say he did not live in either Australia or Canada, or he would surely have known, for collectors in both those countries are greatly interested in the inscriptions that appear in one corner of each pane of stamps which their country issues.

In the case of Australia the imprint, giving the name of the printer, is generally to be found at the left bottom corner, although instances are known where through faulty cutting it appears at the top of the pane. A Canadian imprint may be found at any corner, in the case of small sized stamps, for these are printed in sheets of four panes, and before cutting into quarters, these sheets have the inscription, or imprint, as collectors call it, at each corner.

It is not only in their countries of origin that these imprint blocks are popular. Here at home they are keenly collected, which was the reason why they had to be included in the Commonwealth Catalogue. They had not appeared previously in any British catalogue, and no new departure could have proved more popular.

CHESS ON STAMPS

Cuba has issued a most interesting set of stamps, for chess lovers as well as thematic collectors, for last November the country brought out six stamps, three ordinary and three air, to mark the 30th Anniversary of the World Chess Championship won by their national Jose Raul Capablanca. One of these stamps, showing a portrait of the then champion, is illustrated here.

The victory was no flash of the pan, for not only did Capablanca beat the great Dr. E. Lasker by four matches to none—an unprecedented victory for this class of contest—but he held the championship until 1927, when he was beaten by Dr. Alekhine. The 30th anniversary of anything is a pretty slim excuse for celebration, nevertheless one can excuse Cuba for being so proud of their erstwhile world champion. Thematic collectors will be only too delighted to get another interesting set for their Sport and Pastimes collections.

THE TROPICS

I cannot help asking the Editor to illustrate one of the air stamps of French Equatorial Africa, for it makes such a wonderful picture. All that amazing vegetation, boldly treated, makes our own colonial stamps look very trite and ordinary.

It is a fact that some of the continental countries are today turning out stamps that make those of Great Britain and the United States look like the efforts of kindergarten designers. I can hear someone say that they should turn out well designed stamps, as they have enough practice, issuing as they do so many stamps. But when one looks at some of the designs of British and American commemorative stamps, one cannot help but feel that the designers of these will never be able to turn out anything of such high artistic merit, however much practice they get.

CEYLON

This country is getting some of its stamps from Great Britain and others from Switzerland. The one illustrated on this page appeared in February and it comes from Courvoisiers, the famous Swiss firm of stamp printers. The work turned out by this establishment is thought highly of in some quarters, but of course it is much easier to turn out photogravure stamps than those printed by the recess process. Incidentally the French air stamp illustrated is recess printed.

To return to the new Ceylon stamp, the flower depicted is known as the star orchid, and in the background can be seen the mountains that are its home, the only place where it is to be found.

THE NEW STAMPS

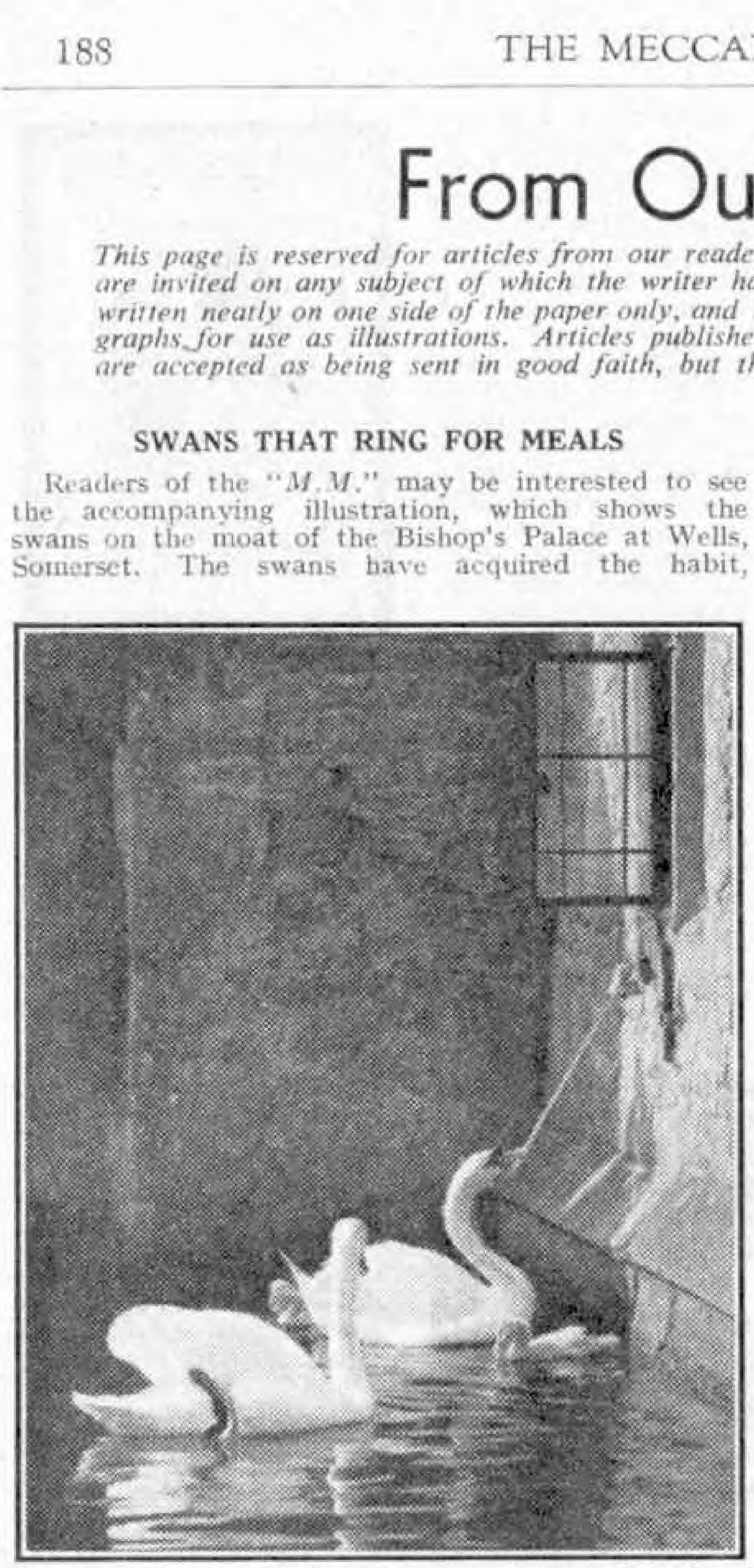
The accession of Queen Elizabeth II will mean the appearance within the next year or two of new stamps for most of the colonies, and all stamps bearing our late king's portrait that are at present current in Australia, Canada and New Zealand also will be changed. Now some of these stamps will have had a very short life, and in the rush of new issues some of them will be overlooked. Then, when they are remembered, they are going to cost a good deal more to buy than they cost today. So don't hesitate.

From Our Readers

This page is reserved for articles from our readers. Contributions not exceeding 500 words in length are invited on any subject of which the writer has special knowledge or experience. These should be written neatly on one side of the paper only, and should be accompanied if possible by original photographs for use as illustrations. Articles published will be paid for. Statements in articles submitted are accepted as being sent in good faith, but the Editor takes no responsibility for their accuracy.

SWANS THAT RING FOR MEALS

Readers of the "*M.M.*" may be interested to see the accompanying illustration, which shows the swans on the moat of the Bishop's Palace at Wells, Somerset. The swans have acquired the habit,



Swans on the moat of the Bishop's Palace at Wells, Somerset, with one of them ringing a bell for food, Photograph by J. Hampson, Farnborough.

handed down through many swan generations, of ringing a bell for their daily food. A string is connected to a bell on the drawbridge and the swans pull this for food, which is thrown from the window. The illustration shows a swan in the act of ringing for breakfast.

The moat was dragged some years ago and many interesting relics were found, including swords and cannon balls. The Bishop's Palace itself, which stands close to Wells Cathedral, dates from the 13th century.

J. Hampson (Farnborough).

A TRIP ON A SPANISH BRANCH LINE

From my first arrival in the seaside town of Sant Feliu de Guixols, on the Mediterranean shore of Northern Spain, I had been fascinated by the little narrow gauge railway that connects it to Gerona, the capital of the province. I had caught glimpses of it from the antique Spanish bus as we jolted down the dreadful road leading into the town, so when at last the time came for me to leave I chose this way to go.

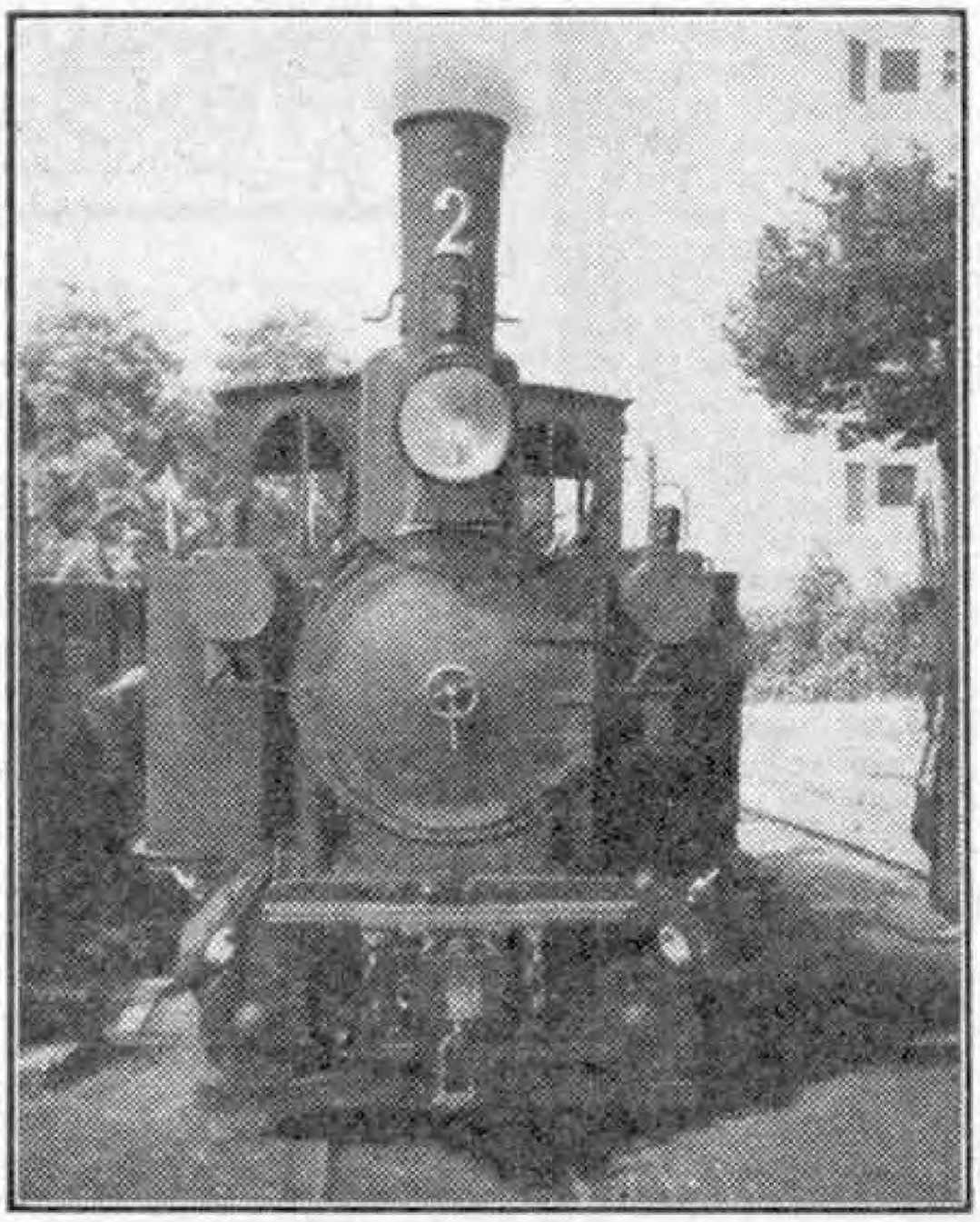
The only practicable train for my connection to France was at 6 o'clock in the morning, so at that hour I carried my suitcase through the deserted streets to the station. I had passed only two people on the way, so I was a little surprised to find the train full. My travel companions, with the exception of one over smart young man, were workmen, of much the same type as English labourers, but with sandals instead of boots.

The carriages were about six feet across, perilously balanced on their close set wheels, and we sat on wooden benches running the whole length of each side. Whoever engineered the railway did so with a minimum of effort, for the poor train had to cope with some quite ferocious gradients, and if it had not been that rust on the rails provided some sort of purchase, I believe we should never have reached the top of some of them.

The train rattled on in the growing light through continual open pine woods and an occasional village. As we moved inland the dawn haze dispersed, and finally the whole landscape took on a new brilliance as the Sun came out and shone through the windows of the little train. The countryside, with its steep little hills and mushroom shaped pines, as seen from this fantastic train seemed quite out of this world.

Slowly the Sun mounted higher and we jolted on endlessly, with here a rocky cutting sprouting vegetation from every cranny, there a vista of far distant blue mountains across an undulating panorama of cultivated fields and scrubby pine woods. The increased frequency of villages foretold a large town, at last, and so we arrived at Gerona, running alongside the main line goods yards to come to our own little station.

I. D. Craddock (Oxford).

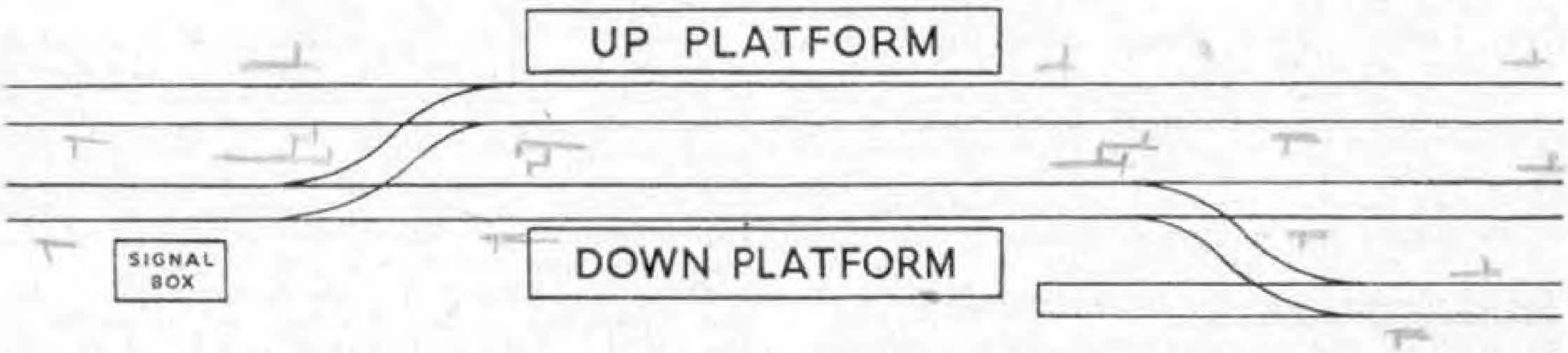


The locomotive of a narrow gauge line in northern Spain, connecting Gerona and the seaside town of Sant Feliu de Guixols. Photograph by I. D. Craddock, Oxford.

Competitions! Open To All Readers

Prize-winning entries in "M.M." competitions become the property of Meccano Ltd. Unsuccessful entries in photographic, drawing and similar contests will be returned if suitable stamped addressed envelopes or wrappers are enclosed with them.

Where Should the Signals Be?



Railway signals have a fascination of their own, especially those covering tracks where fast running is usual. Whether there or in the precincts of a station, however, their placing is not a matter of chance, but part of a definite plan.

The same principle applies to model railways, and this month we present a competition, based on this idea, that should interest all owners of Hornby trains. The diagram on this page is of a simple track layout at a country station. The signals have been purposely omitted, and we ask competitors to insert these in their correct positions, bearing in mind that only signals at present produced in the Hornby Gauge "0" and Hornby-Dublo ranges should be used. Each competitor should draw his own diagram, which can be either in ink or in colour—the Magazine must not be cut—and he must state his age.

There will be two sections, for Home and Overseas readers respectively. In each section prizes of 21/–, 15/– and 10/6 will be awarded for the correct and most attractive entries, with consolation prizes for other deserving efforts. Envelopes containing entries should be addressed *"April Signalling Contest, Meccano Magazine, Binns Road, Liverpool 13."* Closing dates: Home Section, 31st May; Overseas Section, 30th August.

My Most Exciting Football Match

The many thousands of *"M.M."* readers who are football enthusiasts will have been thrilled to read the Editor's account in this issue of his visit to that famous international player Stanley Mortensen, of Blackpool F.C. No doubt it will have set them thinking about some of the thrilling football matches they have seen. We should like to hear about the game that they consider was the most exciting, and invite them to send in their story of it as an entry in this contest. The stories should not be more than 300 words in length, and their interest and spirit will matter more than their "composition" in qualifying for an award.

There will be two sections, for Home and Overseas readers respectively, and in each prizes of 21/–, 15/– and 10/6 will be given for the best entries in order of merit. There will be consolation prizes for other good efforts. Competitors must write their age on their entry, and address this to *"Football Story Contest, Meccano Magazine, Binns Road, Liverpool 13."* Closing dates: Home Section, 31st May; Overseas Section, 30th August.

April Photographic Contest

This is Spring—an ideal subject for the fourth competition of our 1952 series. We therefore invite competitors to submit any photograph that suggests the coming of this season. Each competitor may submit only one photograph, which must have been taken by him, and on the back of his print must be stated exactly what the photograph represents; also his age must be given.

The Competition will be in two sections, A for readers aged 16 and over, and B for those under 16. Each competitor must state in which section his photograph is entered. There will be separate overseas sections, and in each section prizes of 21/–, 15/– and 10/6 will be awarded. Entries should be addressed: *"April Photographic Contest, Meccano Magazine, Binns Road, Liverpool 13."* Closing Dates: Home Section, 30th April; Overseas Section, 31st July.

World's Largest Walking Dragline—(*C. from p. 147*)

and walking are each effected by four separate 230v. motors, each rated at 225 b.h.p. These operate in tandem and are connected in pairs, in series, across their respective generators. For the slewing motion there are two separate motors of the same capacity. The auxiliary machinery comprises a 25-ton electrically operated overhead travelling crane in the machinery house, and an auxiliary hoist gear for raising the boom of the machine. The floodlighting system from the boom employs ten projectors of 1,000 w. and three of 500 w. This is necessary, as the dragline has a working day of 20 hours.

There is an operator's cabin on each side of the machine, and around the front circular girder is an enclosed gallery that ends in time study and recording instrument rooms below the operator's cabins. From the gallery there is a clear and uninterrupted view of all the digging and hoisting operations.

The Oil Tanker "Auris"—(*Continued from page 171*)

the electrical load suddenly failed, and at the same time the fuel supply would be cut off.

Before the turbine was installed in the "*Auris*" it was thoroughly tested in the Rugby Works of the British-Thomson Houston Co. Ltd., who constructed it. It was run on both diesel oil and with a heavier oil, the total running period being 680 hours. The final test consisted of a continuous run of 270 hours on the heavier fuel, mostly at full load.

These tests showed that the performance of the unit was not seriously affected by the type of fuel used, and the gas temperature at full load was a little below the 1,200 deg. F. allowed by the designers. Further tests at sea after the engine had been installed in the tanker proved equally satisfactory, the gas turbine running smoothly and silently and proving itself capable of propelling the "*Auris*" at more than seven knots without any assistance from the three diesel engines installed alongside of it. This promise of efficient performance was fully borne out in the first voyage of the tanker.

Through the Belgian Congo by Rail—(*C. from p. 165*)

our engine, a 2-8-2 No. 314, was replaced by No. 315 of the same class, for the 50 min. run to Ndola in Northern Rhodesia. The section between Sakania and Ndola was worked by both B.C.K. and Rhodesia Railways locomotives.

Ndola is quite an important centre as it is the junction for the branch lines to the Copperbelt towns of Luanshya, Nkana, and Chingola. The traffic on these lines seemed to be handled mainly by 4-8-2s, and on the main line they were supplemented by war-time built 2-8-2 + 2-8-2 "Beyer-Garratts," which carried their W.D. number under the Rhodesia Railways numbers on the cab-sides.

The journey south from Ndola was, to say the least of it, scenically depressing. The line ran in a clearing, some hundred yards wide, and as the forest never seemed to end, we never saw anything else except at crossing loops, where the monotony might be broken by a coal train hauled by "Garratt" or, on one occasion, by two 4-8-2s separated by five loaded coal wagons. Except at principal depots, such as Ndola and Broken Hill, there were no signals; and crossing sidings, as distinct from stations, were unattended, traffic being worked by telegraph orders from the controlling stations. A warning board was situated just under half a mile in advance of each station or siding; each consisted of a sheet of corrugated iron painted white on the side facing the trains to which they referred, with the name of the station or siding in black.

Dawn the next morning found us in Lusaka, the capital of Northern Rhodesia. Here for me the 2,280-mile journey ended after ten and a half days of travel, where the calendar was perhaps more appropriate than the stop-watch, but possibly because of that unrivalled in interest and attraction.

My Day with Stanley Mortensen—(*Cont. from p. 150*)

work up a routine that will help to build them up bodily, to increase their speed and to develop the priceless gift of getting away swiftly from a start.

"Another thing that they must keep in mind is that their football gear should always be in perfect condition. It is hopeless to try to play really good football, for instance, with boots that are not in perfect order."

At this point Stan. looked at me rather curiously, and I wondered what was coming.

"Listen," he said. "Football is not just a matter of weight and strength. They certainly help, and it is important to know just when to use them, and when to bring into play the speed off the mark that good training brings with it. But brainwork is even more necessary. Quick thinking, rapid decision and speedy action are vital, and exercise in this, with the realisation that every player is a member of a team, will help to develop a boy's mind."

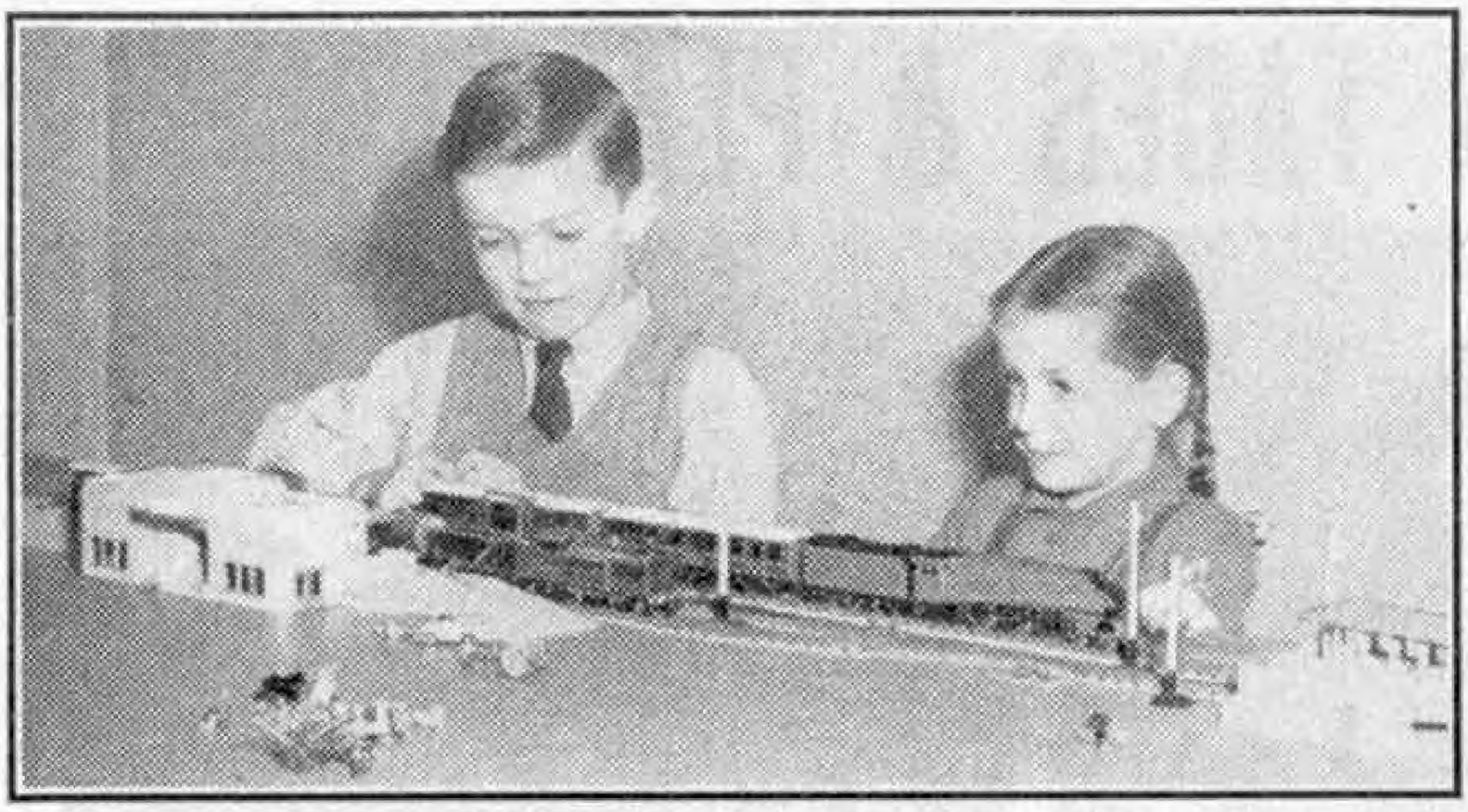
These were Stanley Mortensen's last words to me, and I felt that I must pass them on to readers of the "*M.M.*", because they show that he is not only a thinker as well as a man of action, but also that he possesses the team spirit and sound sense of sportsmanship at which we all aim.

Helicopter Progress at Bristol—(*Cont. from page 169*)

HC.10 proved equally satisfactory for casualty evacuation during the Army exercise "Surprise Packet"; and a standard Type 171 recently made successful deck-landing trials aboard "H.M.S. "*Triumph*," on behalf of the Royal Australian Navy. Operating in wind speeds up to 37 knots, it was used for aircraft guard duties, flying beside the carrier while naval aircraft took off and landed on deck. On one occasion, it was called back to the flight deck, had its rotor blades folded and was "struck down" into the carrier's hangars in a total time of six minutes.

Unfortunately, the British Services are just not helicopter-minded at the moment, despite the fact that experience in Korea has caused the U.S. Army to consider seriously ordering £178 million worth of helicopters in the next three years to replace lorries in many of its transport companies. It is consoling to know that when our people do become helicopter-minded, as they must one day, Bristols already have the Type 171 in production and the versatile Type 173 available later for more strenuous duties.

This Month's Special Articles



Peter and Pamela Webster busy with their Hornby-Dublo railway, the operation of which is shared with their father. The layout is described on page 183.

BRAIN TEASERS

WHAT A WAY TO FIND OUT!

Smith wrote down the names of three well-known makes of motor car, and under the letters in turn, from left to right, he then placed the numbers 1, 2, 3, 4 and so on up to 20. He found that certain numbers denoted letters making up words with the following meanings: 6, 2, 12, 18, iron rod; 20, 12, 15, 18, 7, give out; 1, 2, 3, 4, taken on a hike; 14, 19, 7, 10, 15, 6, famous cricketer; 18, 5, 11, 12, 13, an ancient language; and 18, 9, 16, 7, 20, a British island.

What were the names of Smith's three cars? W.S.

* * * *

NOT BUILDING AT ALL

Word pyramids seem to be popular, and if you found last month's example a trifle difficult, take a breather on this. The six clues are: Just you—or should it be me?; not out; nothing at all; breadth has left it; you are out of place when you get five letters; and now's the time to take that breather. As usual, "build" the pyramid from the top downward. A.R.S.D.

* * * *

SOLUTIONS TO LAST MONTH'S PUZZLES

The name of the plant in our first puzzle in the March "*M.M.*" was Tobacco, the clues leading to the words, To, Boat, Cab and Co.

Here is the original bill of our second puzzle last month:

			£	s.	d.
7	NOVELS	@ 3/6	1	4	6
4	NOTEPADS	@ 2/9	–	11	0
8	PENS	@ –/8	–	5	4
			2	0	10

The nine clues of the word pyramid that formed the third puzzle last month were I, IT, TIE, RITE, INTER, RETAIN, CERTAIN, REACTION, CREMATION.

The best solution received of the problem in the February "*M.M.*" was SUBSPUR, a secondary projection, from C. E. Wrayford, Bovey Tracey, who also suggested ELBAPAC, a puzzle in itself until it is reversed! A postal order for 2/6 has been sent to this reader.

TAL-Y-LLYN RAILWAY PRESERVATION SOCIETY

From the article in the December 1951 "*M.M.*" on the Tal-y-Llyn Railway readers will have learned of the existence of the Tal-y-Llyn Railway Preservation Society. The strenuous voluntary efforts of this band of enthusiasts have ensured the survival as a going concern of this railway, which is the oldest steam worked, passenger carrying, narrow gauge system in the world.

The Society is non-profit making and members form voluntary working parties to attend to the maintenance of the line and equipment. Funds raised by donations and membership subscriptions are devoted to this purpose.

Full details of the Society can be had from the Hon. Sec., Mr. P. B. Whitehouse, 344, Lordswood Road, Harborne, Birmingham 17. Readers who are interested in helping to keep the line going should certainly become members, whether they can join in the working party efforts or not.

THE IRISH RAILWAY RECORD SOCIETY (JUNIOR SECTION)

Many readers in Ireland will be glad to know that the Irish Railway Record Society runs a Junior Section, membership of which is open to enthusiasts between the ages of 12 and 18. A well-organised programme of meetings and visits to places of railway and engineering interest is arranged by the Society. Junior members are fully entitled to take part in these activities, and indeed are encouraged to do so.

Applications for Junior membership will be welcomed by the Hon. Sec., Mr. D. A. Kelly, 4, Ramleh Villas, Milltown, Co. Dublin, who will be glad to give "*M.M.*" readers full information.

A NEW MINIATURE POINTS LEVER

A new lever unit for points operation has recently been added to the "Peco" range of miniature railway material. The lever is of the ordinary ground type and is modelled on the pattern familiar in Western Region practice. There is a downward extension that can be used for under-baseboard control from rodding or an electric points motor, and the extension arm may also be used, in conjunction with electric contacts, to complete circuits required for operations.

The unit is primarily intended for permanent railways of H0 and 00 gauges and similar miniature scales and it requires an opening to be made in the baseboard. The precise method of installation will depend to a certain extent on the type of track in use.

The fitting can be obtained from retailers carrying stocks of the specialities of the Pritchard Patent Product Co. Ltd.

RAILWAY PHOTOGRAPHIC COMPETITION

Readers who are enthusiastic railway photographers will be interested to learn that the Railway Correspondence and Travel Society, in association with the Railway Photographic Society, are organising a Photographic Exhibition and Competition to be held next winter. Entries are invited from railway photographers everywhere, whether members of the above Societies or not. The Exhibition will be held first in London, and then at R.C. and T.S. provincial centres.

Details of the Exhibition and Competition can be obtained from Mr. J. C. Flemons, 48, Boldmere Road, Eastcote, Pinner, Middx.

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READERS' SALES AND WANTS

SALES

30 "M.M.s", "Aeroplane Spotter" complete. Air Pictorials and A.T.C. Gazettes complete. "Aeromodellers" 1942–1947; 80 "Flights"; "Aeroplanes"; "Aircraft of the Fighting Powers" 1, 3, 5. Many other Aircraft Books and Magazines including rare pre-war and wartime issues. Collection Scale Model Aircraft. S.A.E. for details.—A. Jenkin, 92, Harewood Crescent, Honicknowle, Plymouth.

Two Hornby Clockwork Locomotives, 16 Trucks, 100 feet of Rails, many accessories, as new. Cost £18, accept £13 or would split.—Casswell, Naunton Beauchamp, Telephone Bishampton 277.

Hornby-Dublo, comprising Locomotive, Tender, Articulated Coach, 6 Vans, 3 Wagons, Transformer and unused Rails, Circuit and Controller. Offers over £12.—G. P. T. Whurr, 68, Newbattle Terrace, Edinburgh 10.

Meccano. Very large assorted collection. Good condition. Pre-war list price £43. Accept £30 quick sale.—Hinton, 3, Royston Park Road, Hatch End, Middlesex.

No. 6 Meccano Outfit with great many Gears, Sprockets and Clockwork Motor. Excellent condition £4 or offers. Also home-made Photographic Enlarger for beginner. Takes 620 or 120 size film. With lens worth £3/10/–. Accept £4/10/– or offers.—G. Austen, Manor House, Pirbright, Nr. Woking, Surrey.

WANTS

"M.Ms." January and March 1950, November 1951 and February 1952 in good condition.—Box "M.M." No. 52.

"M.Ms." 1933–1938, perfect condition essential, would pay 7d. each copy including postage.—R. K. Sha, 10, Banstolla Street, Calcutta 7, India.

Urgently! Hornby 0 Gauge Clockwork 4–4–0 or 4–4–2 Locomotive and Tender.—D. Joynt, 44, Sycamore Road, Mount Merion, Blackrock, Co. Dublin.

Good prices given for Super Model Leaflets of: New Loom, Traction Engine, Pontoon Crane and Auto. Grabbing Crane, Electrical Parts, Parts for Loom and pre-war Manuals of the larger Models.—N. E. New, 12, Cardiff Road, Reading.

Very old Dinky Toys. Good condition.—C. Griffen, 3, Shanklin Crescent, Southampton.

Dinky Toys and Toy Soldiers any condition. Also Trix Trains. S.A.E. for particulars. Will answer all replies. Write—J. F. Tempone, 2621—92nd Street, Jackson Heights, L.I. New York, U.S.A.

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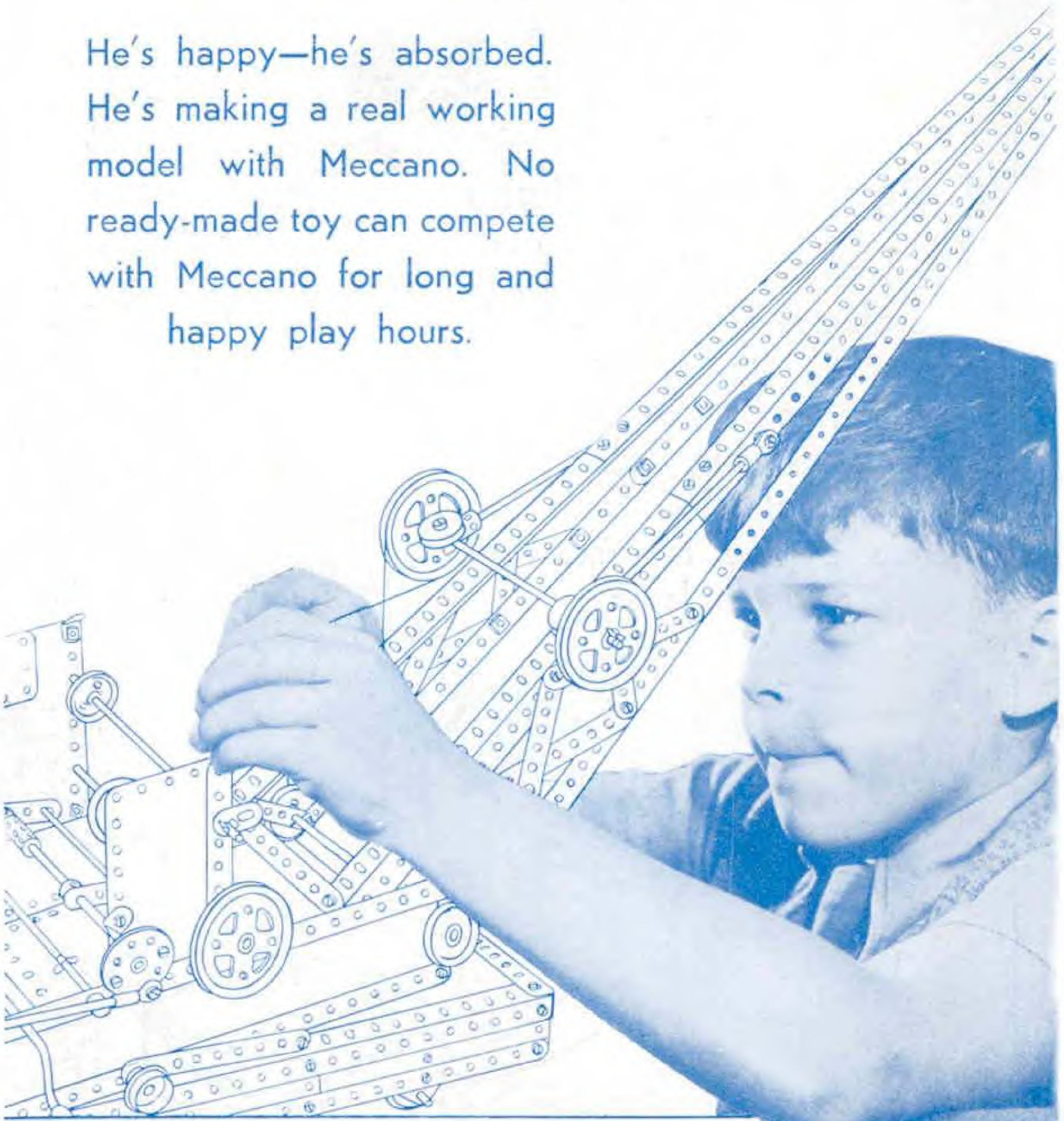

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